



# HOW TO SUBDIVIDE

**A HANDBOOK ON  
THE LAYOUT OF  
HOUSING DEVELOPMENTS**

H. Spence-Sales

COMMUNITY PLANNING ASSOCIATION OF CANADA

# HOW TO SUBDIVIDE

## FOR HOUSING DEVELOPMENTS

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## FOREWORD

The Community Planning Association of Canada is a body of citizens who, whether or not they have technical qualifications in planning, share the conviction that they will live better lives insofar as the physical development of their communities is planned development.

The Association has studied and broadcast surveys and outline plans being made for the regions, cities and towns of this country. These wide-ranging and long-term plans try to set out the proper ordering and balance of the major ingredients for sound growth in our communities. However, the regional planner is no better able to guarantee fine quality in every street than the nutritionist can assure excellent cuisine at every meal.

Good project layout depends instead upon the sensitive judgment of surveyors, realtors, builders, investors and others—those who monthly create additions to the urban scene. Developers of residential projects have been eager to improve on past practices. They now can work in outlying areas, where no previous subdivider has determined their lots. They enjoy new forms of public assistance in preparing land for housing. But they have found little guidance in print on how to lay out attractive groups of dwellings. We are therefore glad to offer for their use this direct step-by-step subdivision method, devised by Professor Spence-Sales of the School of Architecture at McGill University.

Alan H. Armstrong,

Executive Director,

COMMUNITY PLANNING ASSOCIATION OF CANADA

## ACKNOWLEDGMENTS

I am indebted to Professor John Bland, Director of the School of Architecture; to Professor R. DeL. French, Professor of Highway and Municipal Engineering; to Professor F. K. Hare and to Mr. G. R. Mackay of the Department of Geography, McGill University; to Dr. Aimé Cousineau, Director of the City Planning Department, Montreal; to Mr. Alan Deacon, Town Planning Consultant, Toronto; and to many others for their assistance on various technical aspects of this handbook.

And I am grateful to Mr. J. S. Hodgson and to Mr. C. Payette of the Central Mortgage and Housing Corporation, Montreal; and to Mr. J. A. Gray and Mr. G. A. Goulden of the Sun Life Assurance Company of Montreal for their advice on the financial aspects of land subdivision.

I also wish to acknowledge my indebtedness to the Community Planning Association of Canada for whom this pamphlet has been written, and particularly to Mr. Alan Armstrong, its Executive Director, for his help in editing the script; and to Mr. Allan Harrison and the Cambridge Press, Montreal, for the design and printing of the handbook.

H. Spence-Sales





## INTRODUCTION

Within the last five years rows upon rows of new houses have sprung up on the outskirts of the cities and towns of Canada. The land upon which most of this development has occurred had been lying idle in expectation of such happenings. It had long ago, and in earlier speculative days, been earmarked for the purpose by subdividing large tracts of country-side into gridirons of uniform sized building lots. Thus it was inevitable that much postwar housing should have been mediocre in layout—it failed to provide a worthwhile environment for most house purchasers, and it brought disrepute to developers, individually and as a whole.

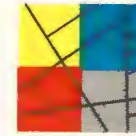
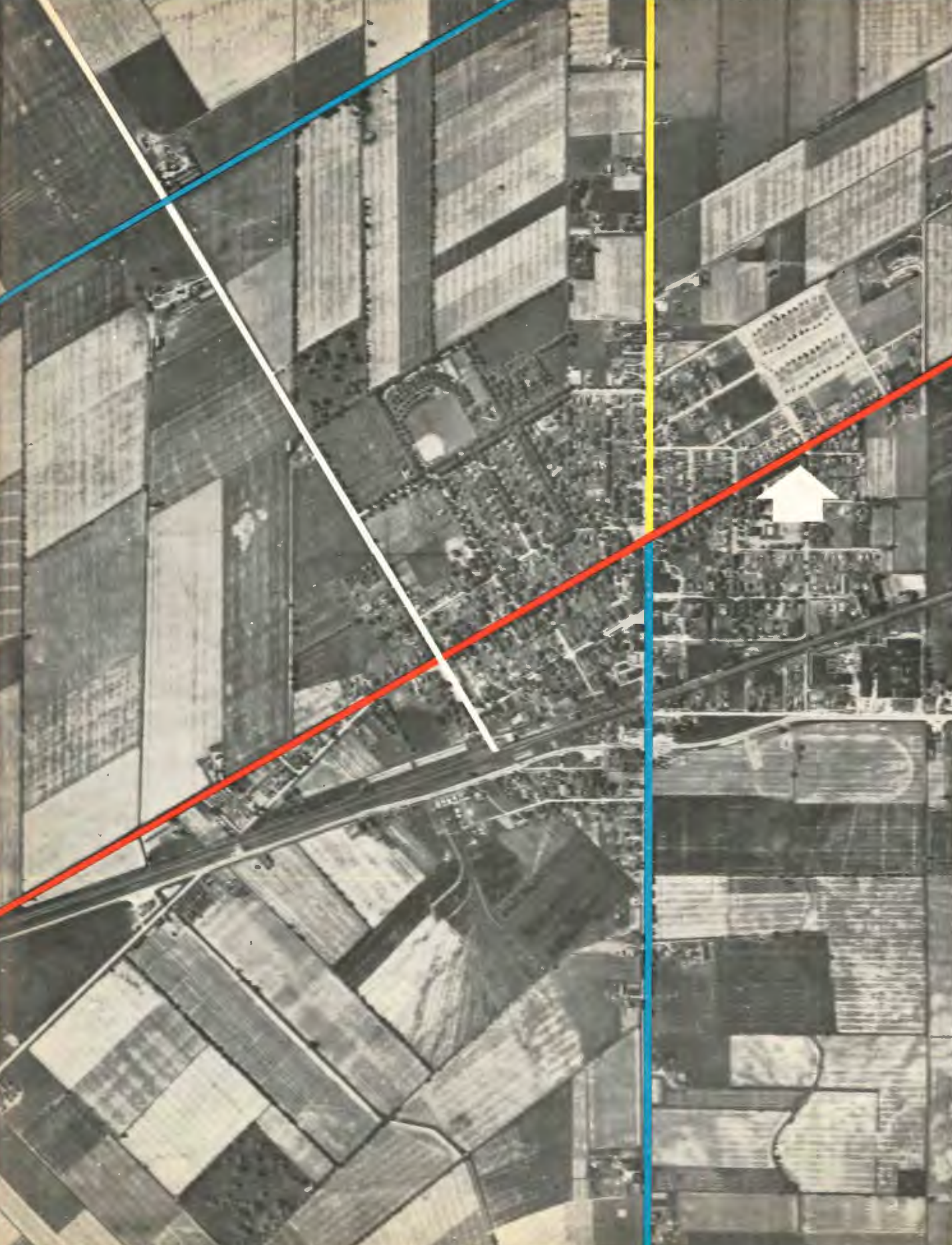
The stage has now been reached at which land needed for further housing lies beyond the belts of registered subdivisions that surrounded our cities for the last two decades. The developer is being freed of at least one of the handicaps which had frustrated much of his endeavours. He now has the opportunity of looking afresh at methods of land subdivision, and of achieving better results than by following entrenched ways of laying out housing developments. Within his grasp there now lies the opportunity, not only to make profit, but to carry out work with distinctive qualities that will add to his reputation and to the lasting satisfaction of his clients.

The purpose of this handbook is to help both the developer that lays out a project which he himself will construct, and the subdivider that lays out lots for sale upon which others will build. It describes a series of steps that should be taken by a developer—from his first decision to undertake a project, through to the point when he is ready to borrow money and to begin building operations. These steps are demonstrated by reference to an actual locality on the Island of Montreal.

The handbook is divided into four parts. The first deals broadly with the effects of patterns of land enclosure upon subdivision. The second part deals with factors bearing on the selection of a site; the third illustrates the sequence of steps that should be taken in the preparation of a layout; and the fourth part deals with some financial aspects of land subdivision.

**PART I**





## BACKGROUND TO SUBDIVISION

In the days of colonization in Canada, the Crown Lands were divided into blocks so that they could be readily distributed amongst the settlers. These blocks, or units of enclosure, were mainly intended for agricultural use—only in a few localities was land set aside and parcelled into blocks suitable for the specific purpose of establishing towns. The enclosures were laid out with mathematical accuracy by surveyors, who followed instructions which were altered from time to time according to government policy on land settlement. Often the surveyors were obliged to vary their methods in order to fit a particular system of enclosure within an irregular shaped area of land.

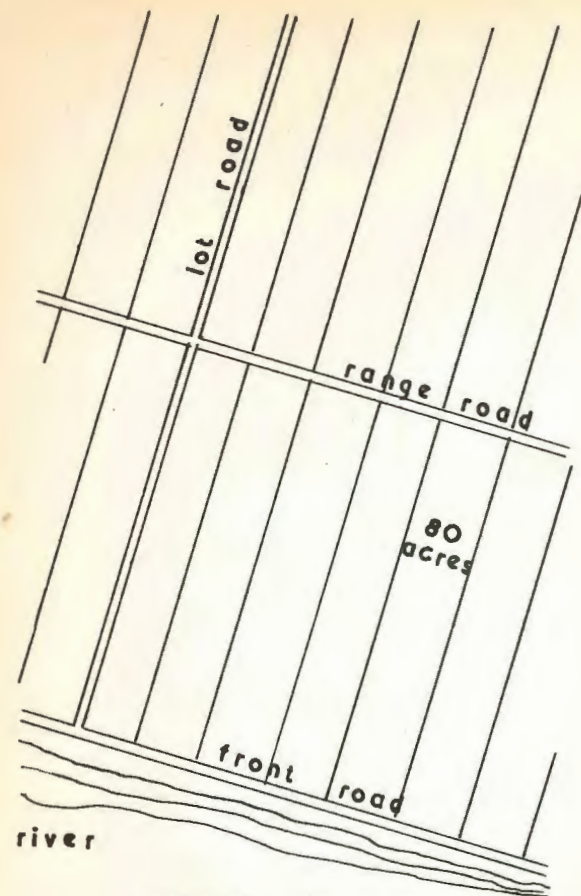
A variety of enclosures has thus been established across the country, with little regard to the physical features of the land or even to its suitability for agriculture. At the time, and to meet the needs of the moment, no better systems of parcelling land for settlement could have been devised. But a lasting mark has been left upon the entire countryside, which will for all time affect the subdivision of land.

**A site to be developed for housing is usually a part of a unit of enclosure, the character and proportions of which exert a specific influence upon the manner in which that site may be laid out.**

The illustration on this page is a photograph of a small town in Ontario. The boundaries of the units of enclosure are the country roads shown in colour. Each enclosure contains a number of farms that are divided into fields. As the town has grown it has absorbed one field after another—its shape and every part of it has been affected by the original pattern of agricultural enclosures within which it lies.

A new subdivision can be seen on the outskirts of the town (upper right). Like every other extension of the town it too has been shaped by the form of the enclosure within which it lies.

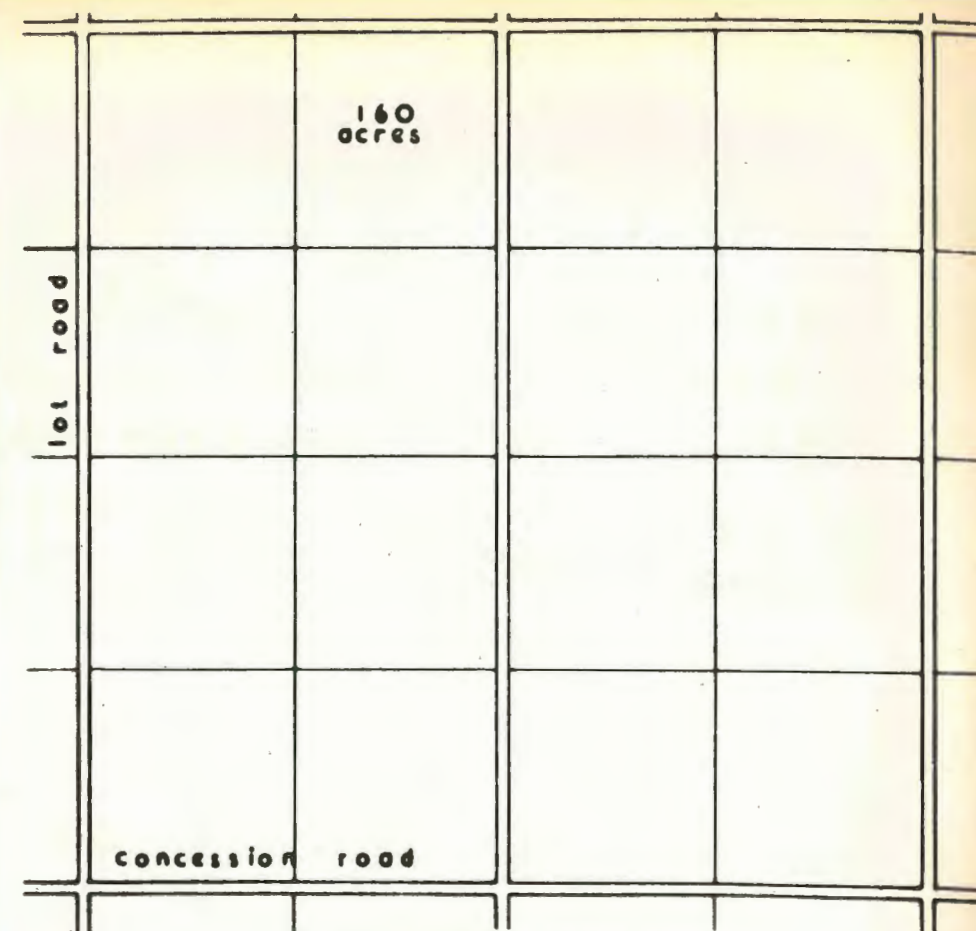




QUEBEC early system

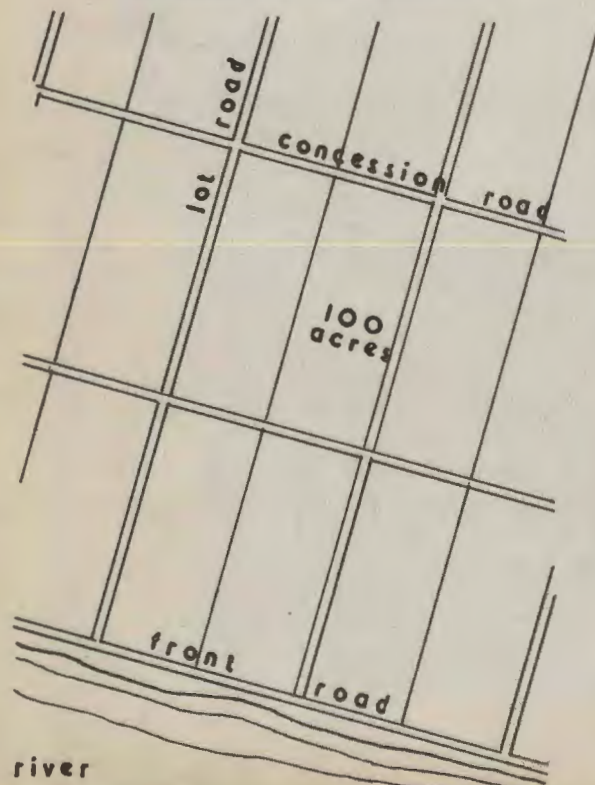


QUEBEC present system

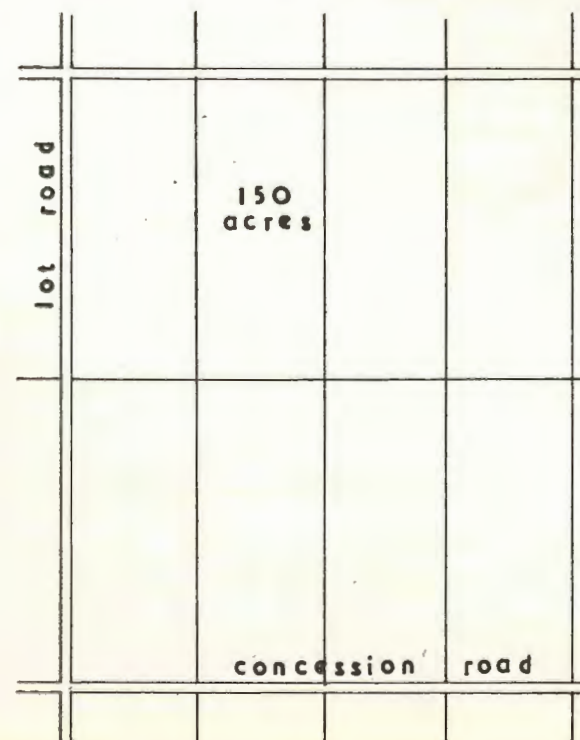


WESTERN CANADA present system

ONTARIO an early system



ONTARIO present system



## THE KINDS OF ENCLOSURE

Broadly the various types of land enclosure in Canada fall into two groups—the French and the English.

The French type is a long lot; it is found in Quebec, and in parts of Ontario, Manitoba and Alberta that were first settled by the French. The long lot stems from the seigneurial system of land tenure and from the agricultural practices of French Canada. Its particular characteristic is its narrow width and great depth, the narrow frontage facing the road.

The English type has two forms—the broader oblong enclosures found in Ontario, and in parts of Quebec and in the Maritimes; and the square sections of Western Canada. The oblong types originated with the arrival of the United Empire Loyalists. As a rule these enclosures had roads on two sides. The Western unit was brought into being in opening up the prairies. The enclosures are absolutely square and have roads on two sides.

The diagrams on this page illustrate the main characteristics of the French and English systems of enclosure.



# PART I

## THE EFFECTS OF SYSTEMS OF ENCLOSURE UPON LAND SUBDIVISION

The cities, towns and villages of Canada have developed within a pattern of land enclosures devised for agricultural use and not urban needs. As urban settlements expand they penetrate still further into an agricultural framework.

The shape of every enclosure has a marked effect upon the manner in which that land can be subdivided. Usually a unit of enclosure is divided into a number of farms—the shapes of the fields being determined by the proportions of the unit of enclosure.

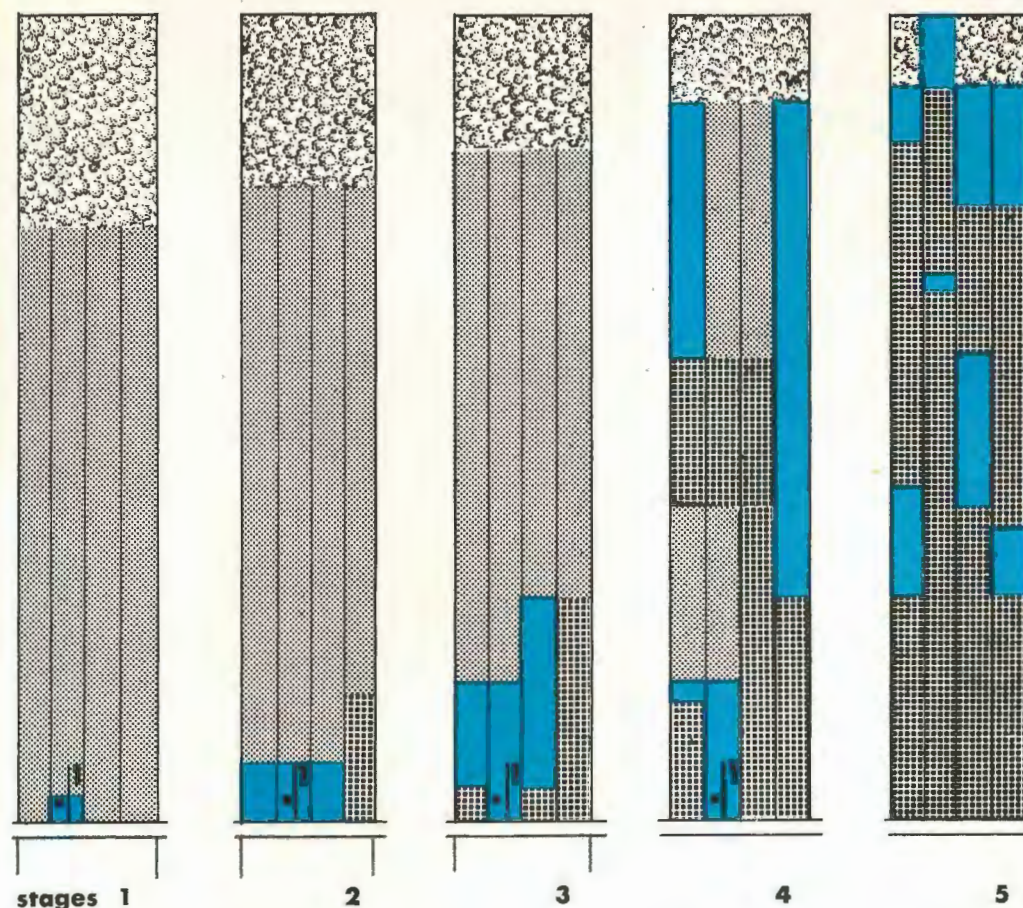
As urban growth expands outwards the agricultural use of land begins to change. At first the farmer finds it profitable to sell small parcels of his land to builders, without wholly upsetting the economy of his farm. Ultimately a point is reached at which his land has no further agricultural value. In very few cases indeed is a farm purchased as a whole for subdivision purposes. As a rule development takes place in the form of a gradual penetration into farm land.

The diagrams on this page show stages in the transformation into urban use of a farm on a French and on an English unit of enclosure.

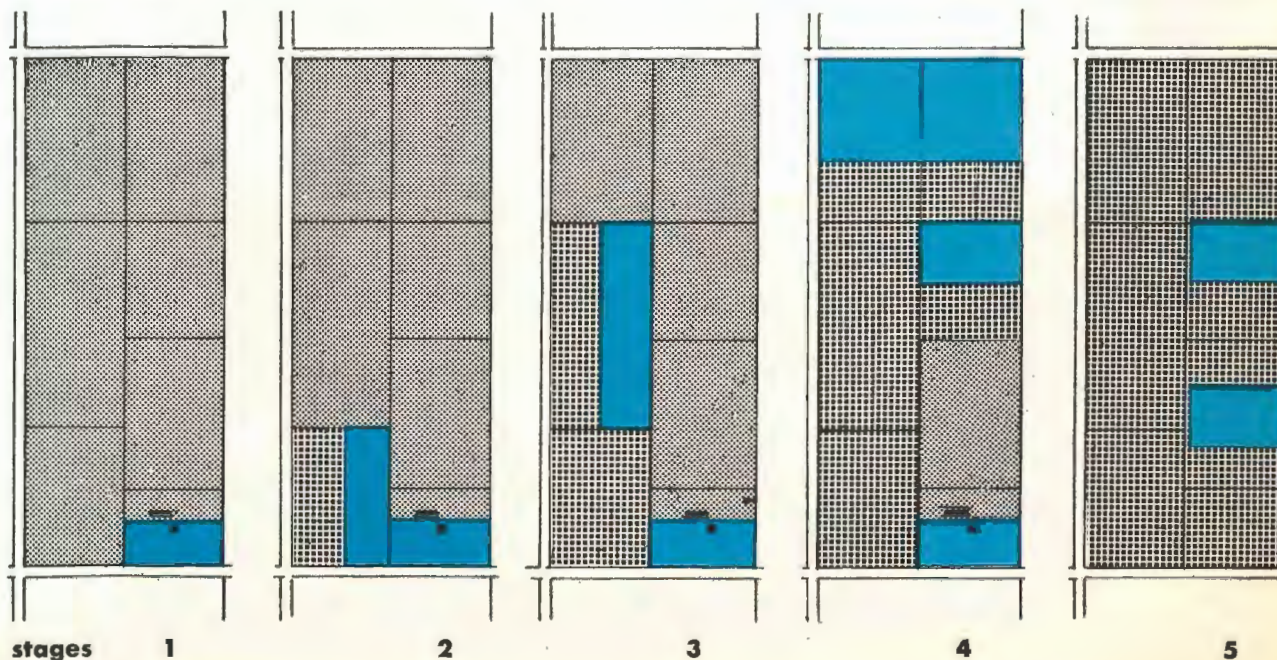
In the French unit of enclosure the ultimate pattern is one of long rows of development extending far back from the frontage road and reaching the opposite boundary of the enclosure. There are few cross streets and the penetrating roads are usually dead ends.

In the English type of enclosure subdivision does not result in long rows of developments; cross streets are more easily achieved; development expands in a less elongated and more compact form.

So long as development penetrates bit by bit within individual farm fields, a gridiron pattern is inevitable.

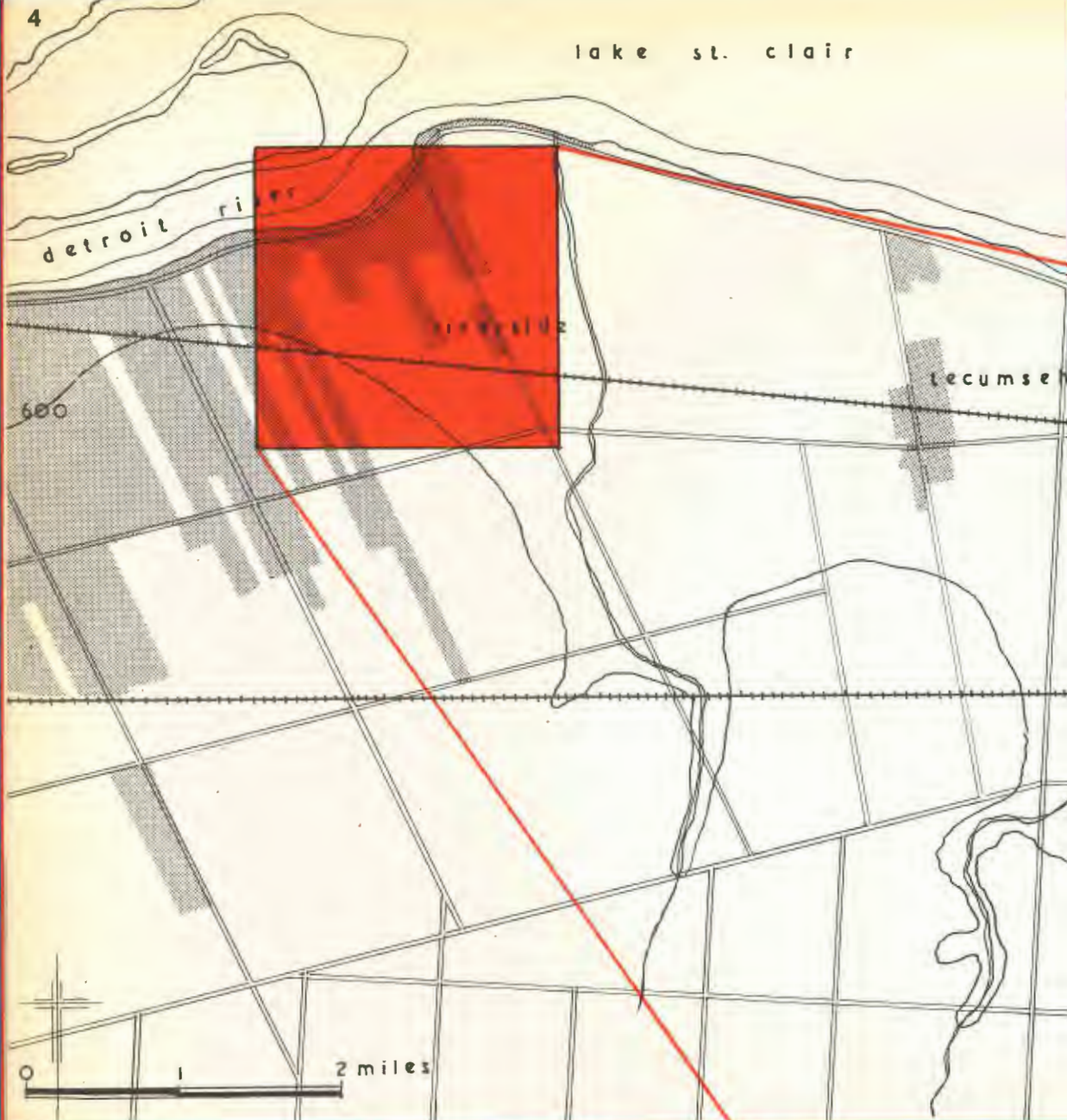


QUEBEC long lot



ONTARIO rectangular lot





This is part of the outskirts of the City of Windsor along the Detroit River.

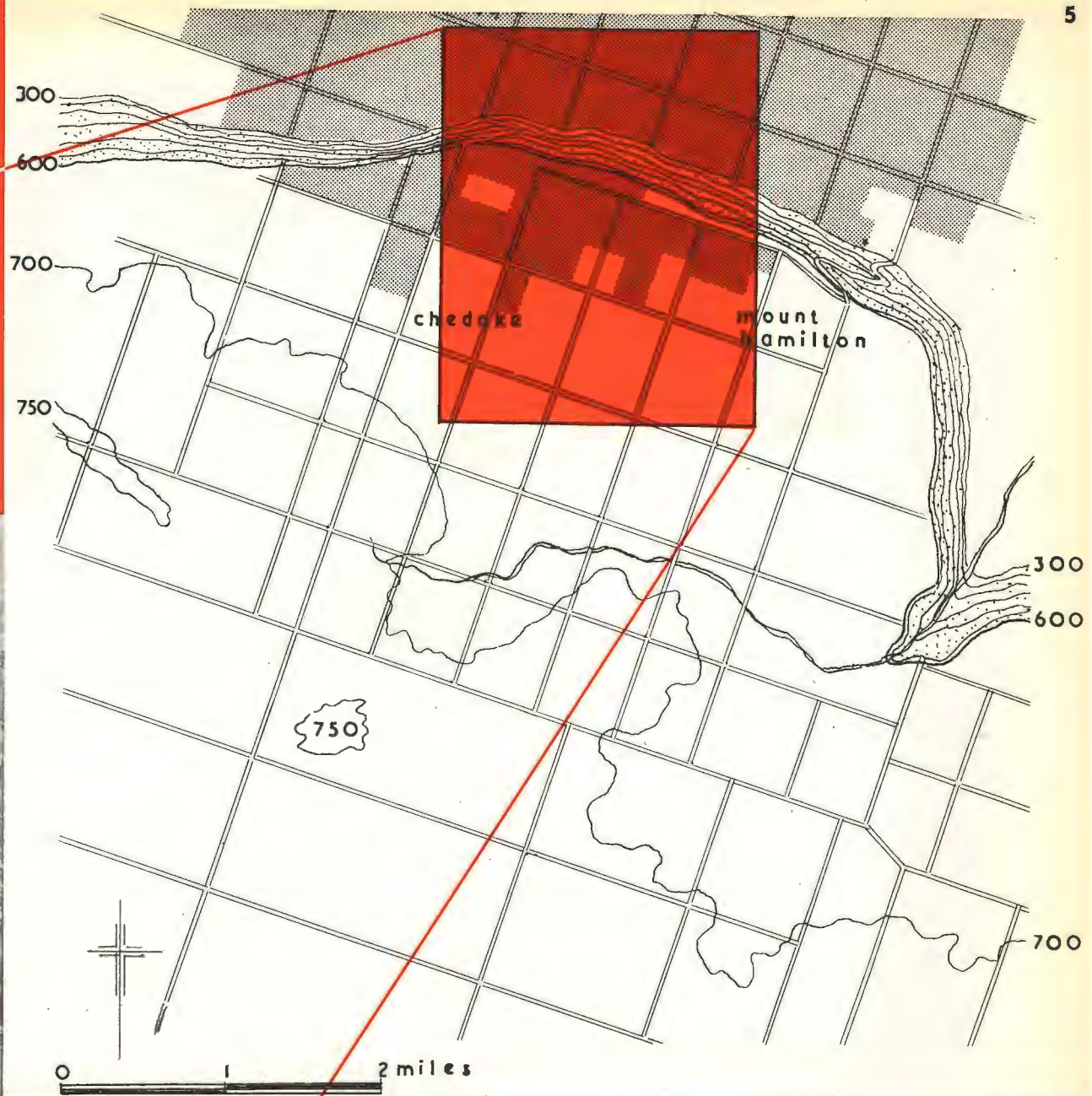
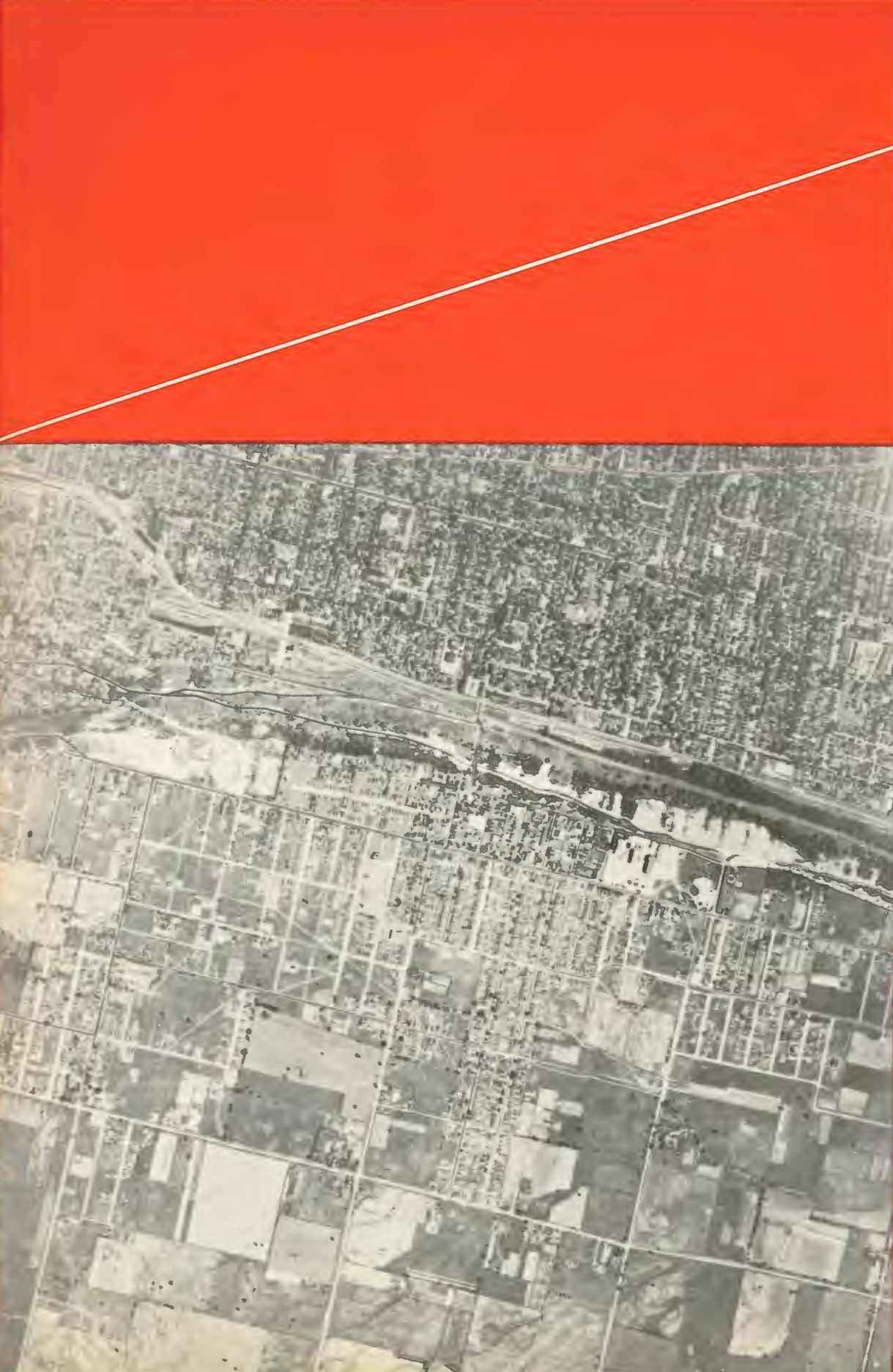
The map shows the basic pattern of long lot enclosures into which the land was originally divided. The built up areas are shown in grey.

The aerial photograph covers the territory contained within the red square.

Observe the long lot farming system and the way in which development stretches in lines within fields. It will ultimately develop into an attenuated gridiron.







This is part of the outskirts of the City of Hamilton.

The map shows the rectangular system of English enclosures into which the land has been divided. The built up areas are shown in grey.

The aerial photograph looks down on the portion of the map contained within the red square.

Compare this type of enclosure with that at Windsor. It is totally different. It is more compact but in time it will also lead to a gridiron pattern of development.



SARNIA





## PART I

So long as the growth of cities and towns proceeds by way of piecemeal extensions of existing development on land already subdivided, or within the boundaries of a single field, it is inevitable that gridiron patterns will continue to spread.

The factor which most affects a subdivision scheme is the shape and character of the site. Now that most of the land affected by registered subdivisions has been absorbed, the developer should be able to select a parcel of land less restricted in its proportions. He should acquire land of a size and shape that allows for better layout. It should not be a long and narrow strip—it should be more square; and the developer should regard variations in the physical features of the land not as insuperable difficulties but as qualities of the land that might lead to a new and more attractive pattern of subdivision.

**The aerial photograph of Sarnia on the opposite page shows on the left hand side a new development which differs from all that adjoins it. The unit of land upon which it has taken place is not the same as the other parcels of surrounding agricultural land. It is larger than others; it is more nearly square; it is also somewhat varied in character.**

**Turn back to the first illustration on page 1.**

**Compare the two developments. They are different in scale, but the one at Sarnia does not perpetuate a gridiron development.**







## PART II

### SELECTING THE SITE

#### THE FIRST STEP:

*To demonstrate the way in which a subdivision scheme should be prepared an actual case will now be followed step by step. It is the case of a developer, operating in a particular town on the Island of Montreal, who has decided to undertake a housing project. His scale of operations would enable him to embark on a scheme involving the erection of about 200 houses within a year.*

*The aerial photograph on the opposite page shows the town.*

Subdivision is undertaken to provide houses in answer to demand. Upon the ability of the developer to meet the market for housing will depend the success of his subdivision scheme.

**The first step is to assess the demand for houses in the town as a whole:—number of dwellings called for, their types, and price ranges within which they must fall.**

An exact prediction of housing demands is not possible. So many variable considerations are at play that the market can only be assessed approximately. The concentration upon dwellings of one or two types for owner occupancy—commonly considered by builders to be their only market—as a rule deprives the developer of a greater range of prospective clients. In Canada shortages of housing exist for couples without children, for families with three or more children, and for old people. Rental housing is most of all in demand.

**The amount of housing needed may be gauged by taking the following considerations into account:**

- (a) as houses deteriorate and fall out of use for a variety of reasons they should be replaced by new houses. In the most general terms about 2% of the total number of houses in an urban area need to be replaced annually.

- (b) in addition, the rate of house construction requires to keep abreast of the rate of increase in population. A failure in past years to maintain a proper rate of construction creates a backlog of demand.
- (c) further, there should be a certain amount of vacancy so that normal movements can take place. The vacancy rate in broad terms should be about 2% of the total number of houses.

**The type of dwellings in demand may be measured by enquiring into:**

- (a) the extent to which the needs of different sized families are adequately catered for.
- (b) the extent to which families of various income levels are properly housed.

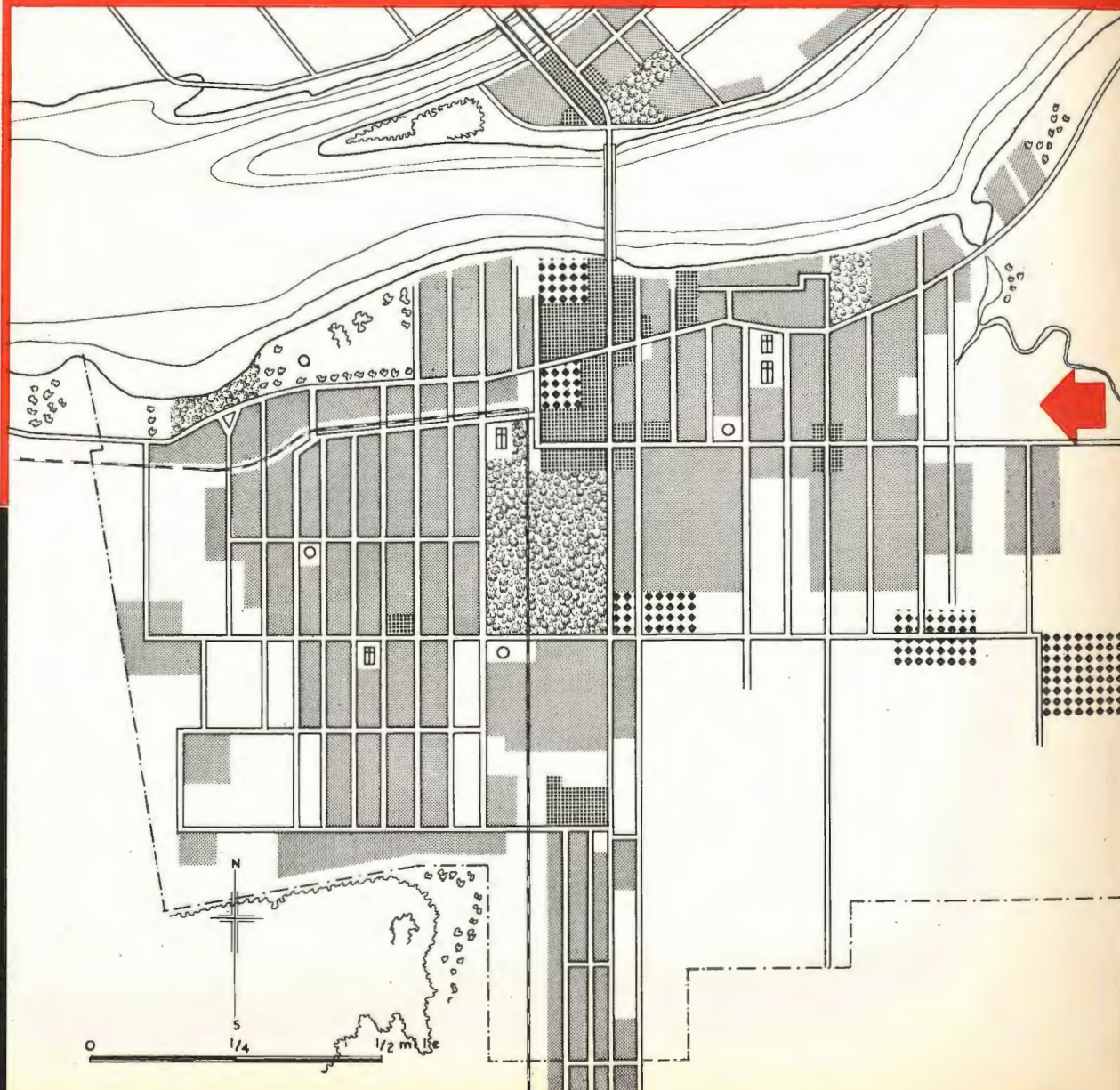
**The selling price of dwellings may be assessed by examining:**

- (a) the statistics covering employment, wage scales and personal savings.
- (b) the ranges of down payment that can be expected locally.
- (c) the demand for house ownership on the one hand and for renting on the other.

Direction on such matters can usually be obtained from the regional and local offices of the Central Mortgage and Housing Corporation, and from the municipal authorities.

**In the particular town under review the market indicates a demand for houses for couples without children, and for young families with 2 or 3 children. The types of dwelling accommodation needed in this specific case are: three room apartments, and five and six room houses, in the proportions of 1:4:4. The selling prices should range from \$7,500 to \$9,000. The down payment should be less than \$2,000 for any dwelling.**







## PART II

### THE SELECTION OF THE SITE

#### THE SECOND STEP:

The direction of growth of the town will suggest where the demand for houses is most acute. But the demand in a particular locality may be somewhat different from that of the town as a whole.

**The second step is to examine the physical growth of the town.**

The demand for housing will probably be greatest on the outskirts of urban areas which have recently been made more accessible. The factors to be taken into account are the direction and rate of urban development; the type and direction of traffic and transport developments; the opening or improvement of main traffic routes; and the location of new houses, schools, industries, shops, and recreational and public buildings. In addition, the proposals of the local authority with respect to the provision of services, zoning control, and town planning must be taken into account.

**The maps on the opposite page show on the left hand side the plan of the town as it was ten years ago; and on the right, as it is today.**

The areas indicated in grey are residential developments. By comparing the two maps it will be seen that the increase in residential development during 10 years has been considerable.

Expansion has taken place in most directions, leaving undeveloped land mainly on the eastern side of the town.

The areas indicated by small dots are commercial localities. It will be observed that the central shopping area has expanded and that three new local shopping centres have developed.

Industries are indicated by the larger black dots. The trend in industrial location is towards the east.

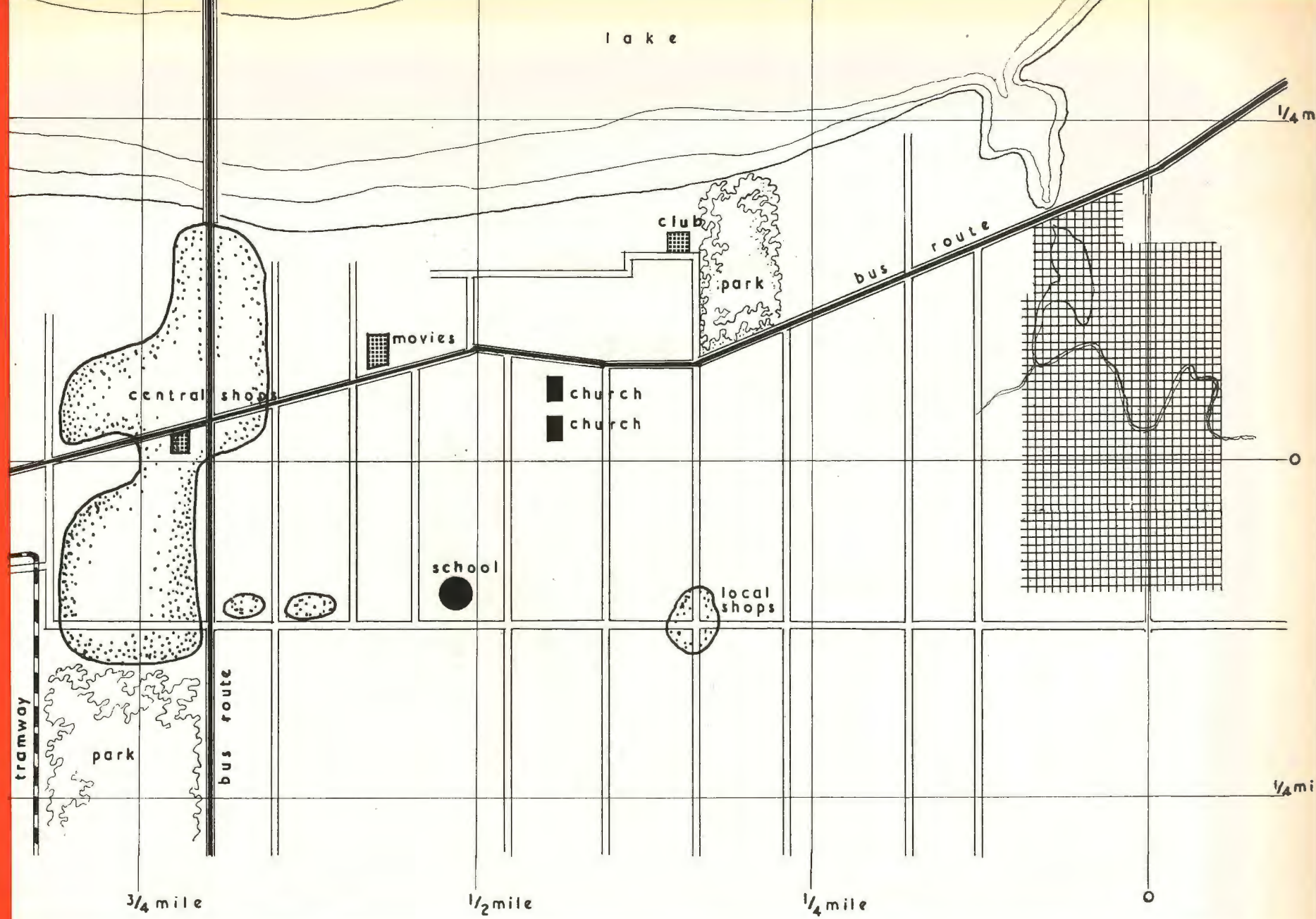
Schools are indicated by circles, and churches by squares with crosses. The dotted line is a streetcar route to the city of Montreal.

The most significant traffic development has been the general increase of public transport facilities, particularly the bus services along the road running east and west and parallel to the river. It provides communication with adjoining municipalities and the centre of the town.

The local authority has provided services in the locality which will be extended as development grows. Zoning control is exercised over the whole town. There is no master planning scheme, but it is proposed to widen the Lakeshore Road for main traffic.

The locality that suggests itself for a housing development is on the northeast side of the town in the land through which the stream enters the river. A number of sites are offered for sale in the vicinity.







## THE SELECTION OF THE SITE

### THE THIRD STEP:

Studying the market for housing and the growth of the town, will suggest the locality in which a project would be best located. The selection of a particular site within that locality is dependent upon a judgment of the relative suitability of the different parcels of land that are offered for sale.

**The third step is to consider carefully all the possible sites, and to select the one that most fully satisfies certain requirements.**

A satisfactory site should measure up to the following considerations.

**Accessibility**—It should be accessible from a main road along which good public transport facilities are provided. The stop on the transit system should not be more than  $\frac{1}{2}$  a mile from the furthest part of the site. A shopping and business centre, recreational and social facilities, and churches should not be more than 1 to  $1\frac{1}{2}$  miles distant. The schools should not be more than  $\frac{3}{4}$  of a mile away. These standards may vary in different parts of the country. The Education Authority should be consulted.

**Adjoining development**—The site should not be in close proximity to inferior or obsolete housing, commercial activities or industries which would be detrimental to the project.

**Availability of Services**—Water supply, sewage disposal and garbage collection; gas, power and telephone connections; and police and fire protection should be available.

**Safety and Health**—Traffic hazards, noise and vibration arising from railways and industries, and atmospheric pollution caused by smoke, dust and odours should be absent.

**Qualities of the Land**—The soil and subsoil should be suitable for excavation, building purposes, and planting. It should be free from surface floods and ground water. The topography should permit easy grades for streets and good building lots. It should have natural amenities such as trees and pleasant prospects.

**Cost of the Land**—The cost of the land should be well within the scope of the project. As a rule the cost of raw land per lot should not exceed 5% of the cost of construction of a house and its services. If the land is serviced, its cost per lot should not exceed about 10% of the cost of building the house.

**Legal Encumbrances**—The title to the land should be clear and it should be free of legal restrictions that may hinder its proper development.

Few sites are without difficulties. Many of the qualities of a parcel of land can be appreciated at first glance but the final decision on selecting a site must depend upon carefully balancing its advantages against its defects. Certain limitations may totally preclude development while others may be partially remedied. The selection of a site must not be determined solely by the cost of the land.

**The illustration opposite shows the site that was finally selected. It is cross hatched. The diagram shows its relation to its surroundings. The distance from about the centre of the site to various points in the town can be measured by the quarter mile grid.**



## PART II

### THE CHARACTER OF THE SITE

On the right is an aerial photograph of the selected site. Its boundary is indicated by the white line and it contains approximately 48 acres.

The road running through the site is unpaved. It was formed in anticipation of development and registered subdivisions front it on both sides. A farm lane crosses the road, just below the stream. The buildings on the site are a farm house and sheds.

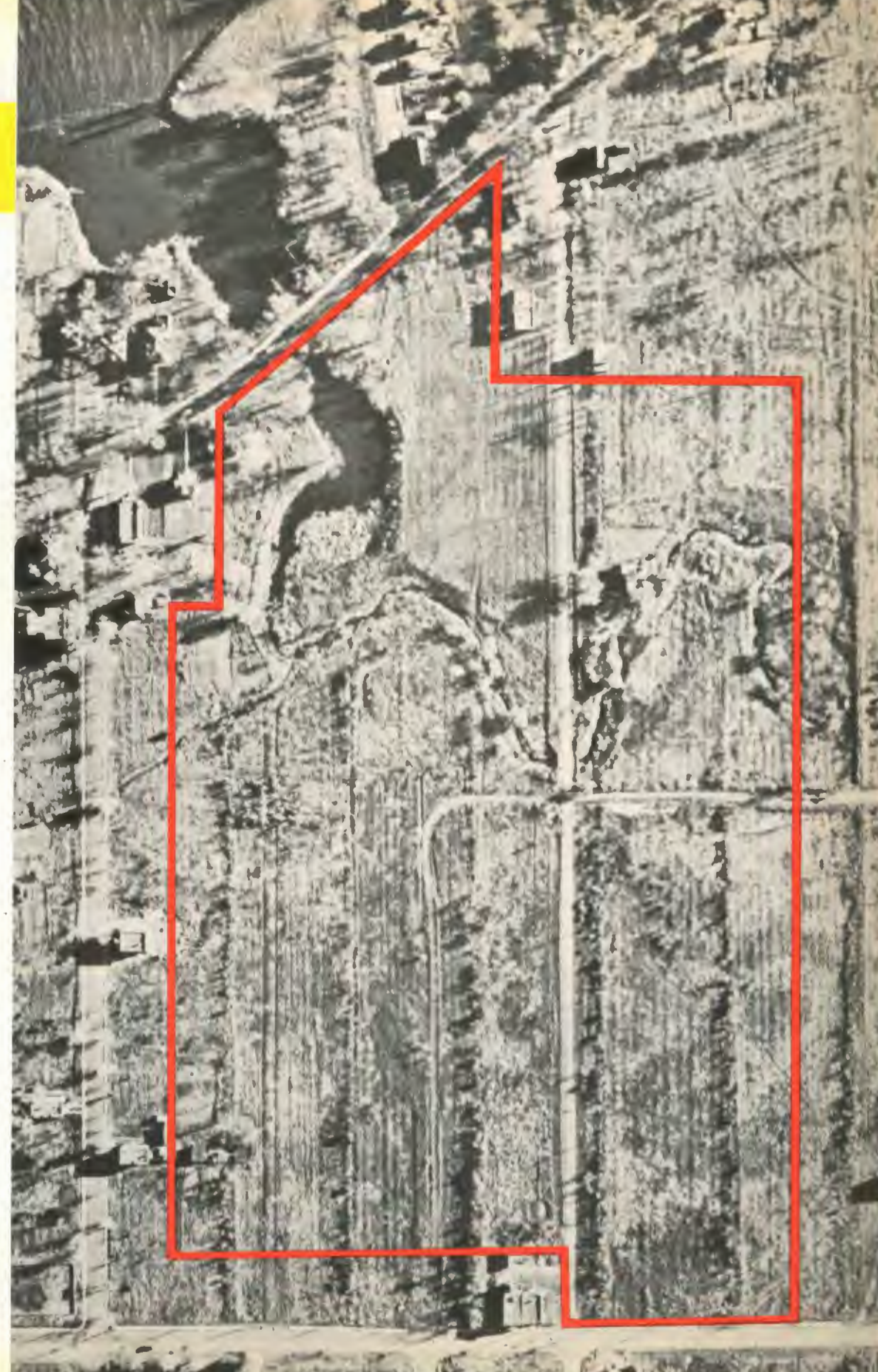
The site is accessible from the Lakeshore Road and from the local development road on the opposite boundary. The adjoining development along the Lakeshore is housing on large plots; to the west and south, land is ripe for development. To the east is farm land.

Services are available along the Lakeshore Road and at the opposite end of the site.

The only traffic hazard to be met might be at the junction of an access road to the site along the Lakeshore Road. Some noise may be expected in this vicinity. The atmosphere is free of pollution because of the prevailing northeast wind.

The soil and subsoil are generally suitable for building purposes. Most of the land was in agricultural use until recently. Some difficulties can be expected from flooding along the entire length of the stream; but improvements to the land can easily be made by straightening out the bends in the stream and by back-filling.

The total cost of the site is \$96,500 or approximately \$2000 per acre—a figure within the margin of 5% of the likely cost of construction and services of say 8 houses to the acre at \$7,500 a house.





## PART III

### PLANNING THE LAYOUT

#### THE FOURTH STEP:

A layout cannot be planned without a thorough knowledge of the physical features of the site and its surroundings.

The fourth step is to obtain a general survey of the site prepared by a qualified and experienced land surveyor—the cost will be handsomely repaid to the developer.

A general survey differs from the type of survey required to establish the ownership of property. Every aspect of the land and its surroundings that will affect the manner in which the site might be developed is recorded on a base map. It should embody the following information.

#### THE SITE AND ITS SURROUNDINGS:

- (i) the boundaries of the site; the streets and paths; the existing buildings; the registered subdivisions not built upon; the use to which undeveloped land is put.
- (ii) the sewers, watermains, gasmains, and power and telephone lines.
- (iii) the proposals of the local authority with respect to planning and zoning, new streets and widenings, and the extension of utilities and public services.

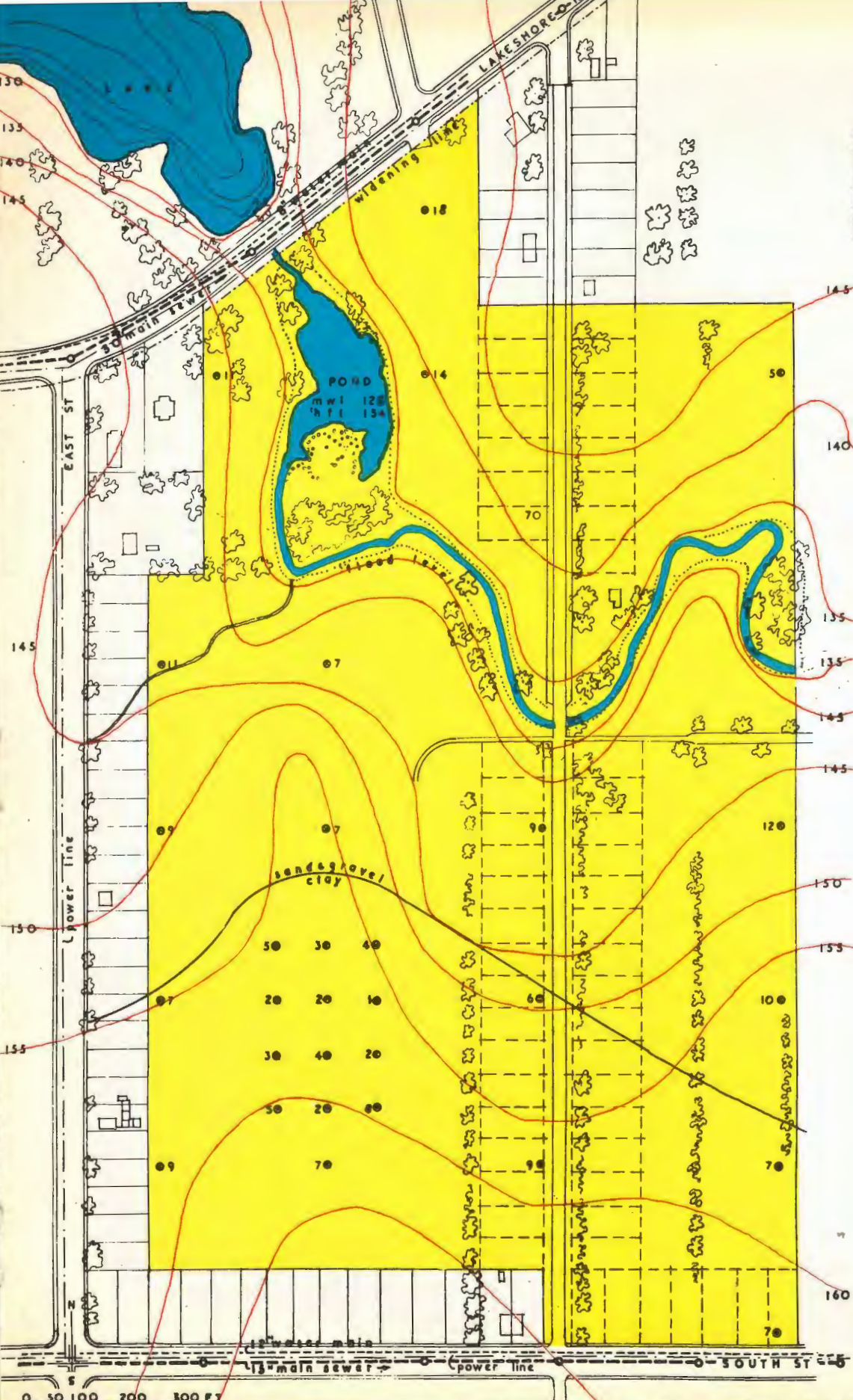
#### THE TOPOGRAPHY:

- (i) the contours of the land, and the types and distribution of the topsoils and subsoils.
- (ii) the waterways and marsh lands, and land liable to flood or subject to high water table.
- (iii) the trees and hedges.
- (iv) the climate; the rainfall, and the prevailing winds.

An aerial photograph of the site and its surroundings is of great value—it shows aspects of the site that a map cannot reveal.

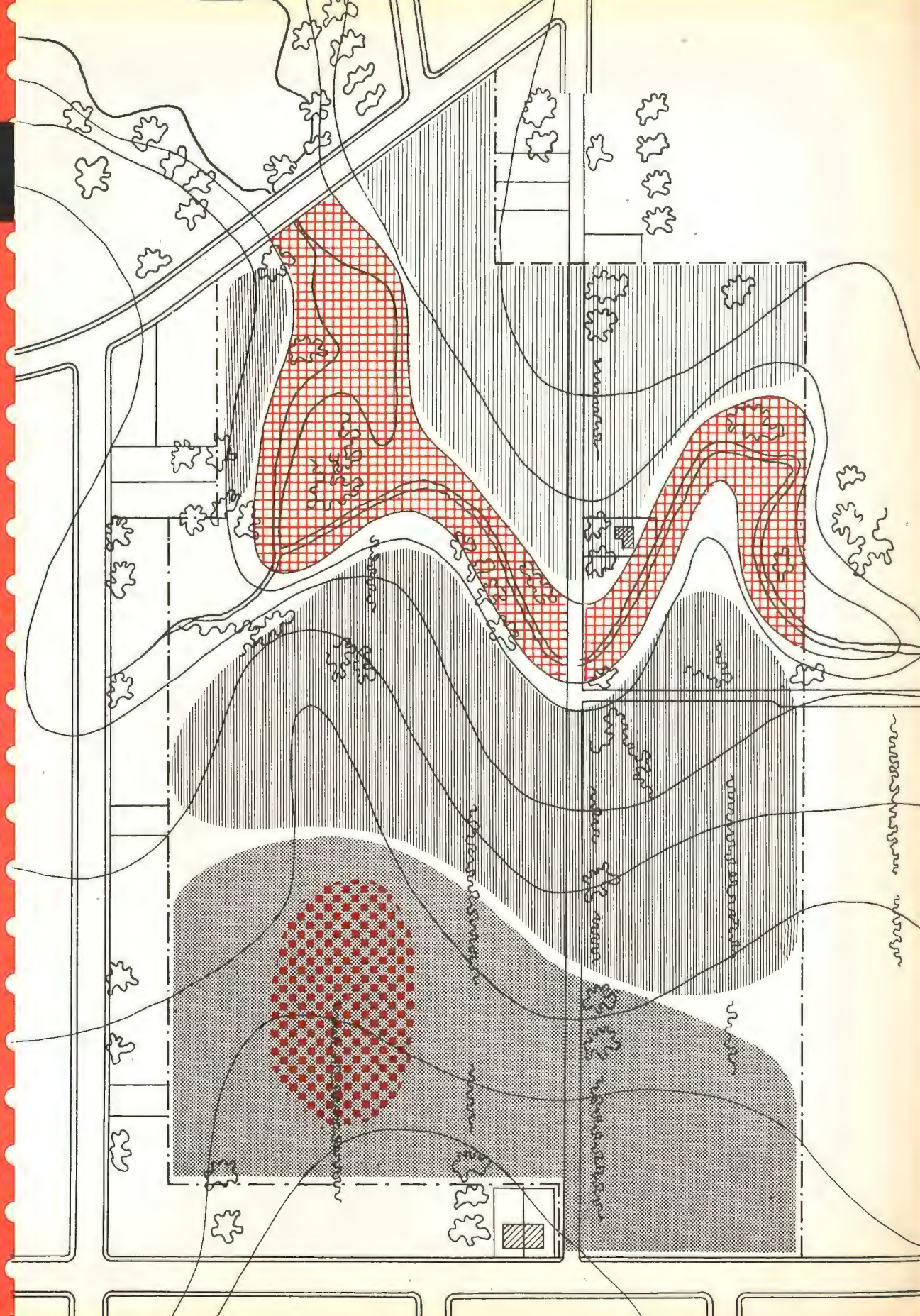
The base map of the site is illustrated on the left. Compare it carefully with the aerial photograph next to it.

There is no master plan for the locality but the zoning bylaws prescribe that the site may be developed for single family dwellings; apartments may be erected along the Lakeshore Road; and shops along South Street. A widening is to take place along the Lakeshore Road.





# PART III





# PLANNING THE LAYOUT

## THE FIFTH STEP:

The use to which land is put must be determined to a great extent by the character of the land. An examination of the physical features of the site may reveal that it is not uniformly suitable for building purposes, and that certain parts of it may differ in their fitness for residential development.

**By classifying the land an accurate appreciation of the advantages and disadvantages of each part of the site can be obtained.**

**The fifth step is to divide the site into broad areas of relative suitability for building purposes.**

The base map should be examined to see which parts of the site fall into one or another of the following classes:

### BEST QUALITY LAND:

it is fertile and self-draining; it is easily excavated but has good bearing qualities; it has an even fall between 3% and 10% which enables rapid draining away of normal rainfall; it slopes generally towards the south thereby possessing good exposure to the winter sun; it is wooded and offers pleasant views.

### GOOD QUALITY LAND:

it is less fertile than the best land but is self-draining; it is less easily excavated but has good bearing qualities; it has a fall of less than 3% and thereby normal rainfall is not easily drained away; the slope of the land is generally to the east or west; it has few trees and may have a view towards an amenity to be created.

### MEDIUM QUALITY LAND:

it has poor, unfertile soil which is not self-draining; it may be difficult to excavate but would have good bearing quali-

ties; it is flat and does not permit the draining away of normal rainfall, or the land may slope steeply towards the north, thereby being deprived of sunlight; it is bleak and has no existing or potential amenities.

### POOR LAND:

it is marshy, liable to frequent floodings, or has a high and fluctuating water table; it may on the other hand be so steep or rocky as to prohibit building.

These classifications are only a guide; they will seldom be exactly applicable. First discover the best land on the site. It may not have all the qualities outlined in the highest category, but it should be used as the criterion for assessing other parts of the site.

The illustration on the opposite page shows the site divided into areas according to their suitability for building purposes. The lightest shade indicates the best land. It is fertile, easily excavated, and has a good even fall towards the south. It has good prospects towards existing amenities in one part, and towards a potential amenity in others.

The middle grey area shows good quality land. The soil is as fertile as it is in the first quality land. Its slopes are as even—but they fall to the north. It has prospects towards potential amenities.

The darkest area is medium quality land. It is clay; it is flatter, and slopes to the north. It is far removed from any potential natural amenity.

The poor land is shown in red. The area cross-hatched is liable to flood. The heavy dotted area is poor land because of bedrock close to the surface, and a high water table, due to general fall of the land, the rise in the underlying rocks and the clay soil.



## PART III

### PLANNING THE LAYOUT

#### THE SIXTH STEP:

The quality of land on a site may often be improved so as to render it more suitable for building purposes. Usually soil drainage, grading, and levelling can effect considerable improvements to otherwise mediocre land.

The sixth step is to consider means by which the qualities of the site can be improved.

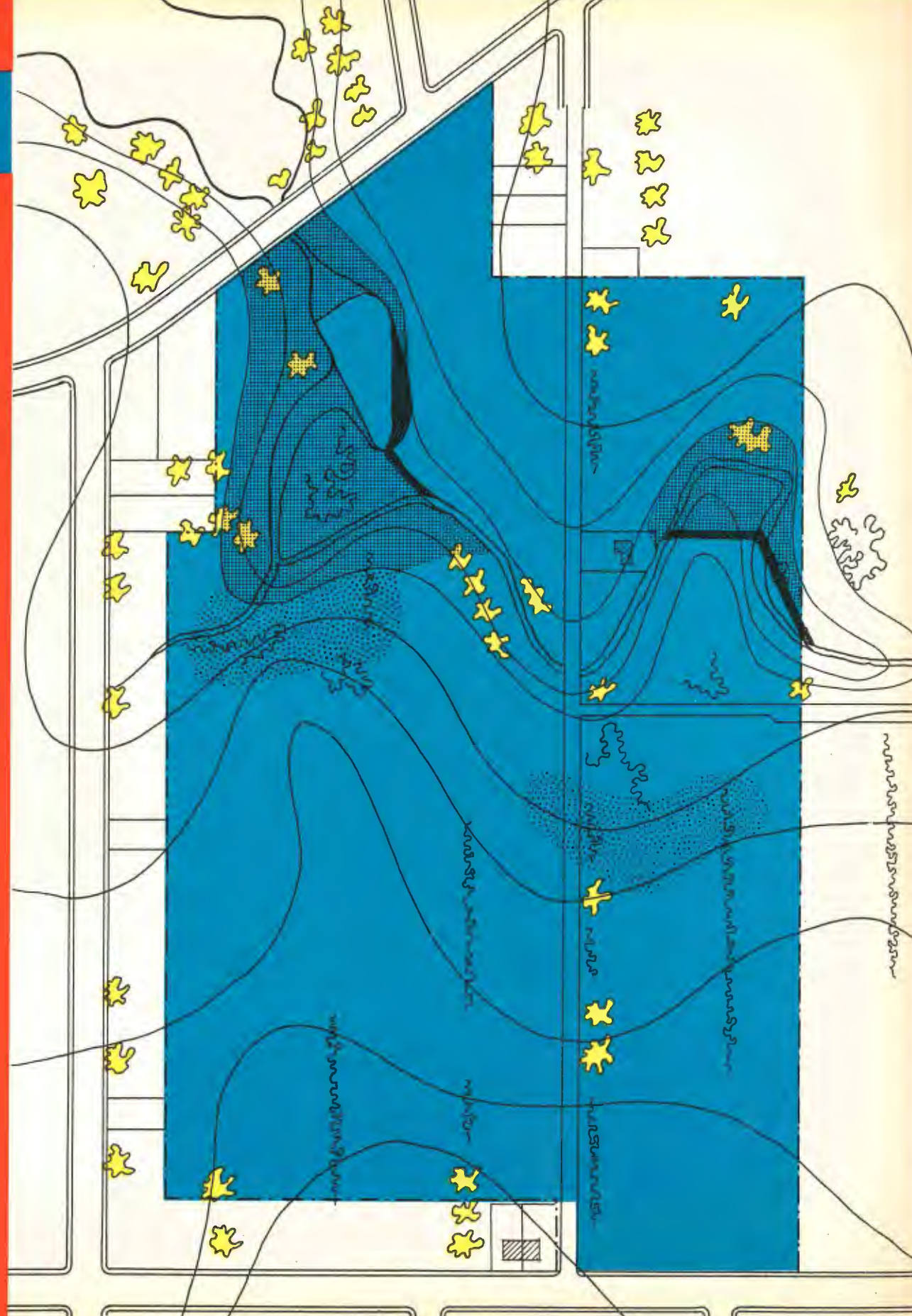
All soil that is likely to bear water should be drained—particularly stagnant pools and marshes.

Grading should be adapted to the uses to which the land is to be put, and the surface drainage of the land after grading must be considered. Great care should be exercised in removing the topsoil and saving it for re-use. Irreparable damage can result from the unplanned use of grading machinery.

Land which has been filled should consolidate before it is used for building purposes.

The illustration on the right shows improvements that can be effected in the quality of the land.

New channels can be cut for the stream so as to eliminate bends which have caused scouring. Considerable reclamation can be effected by back-filling on the banks of the stream and around the park, from spoil obtained from the basements of houses. The total amount of land which can thus be redeemed is approximately three acres.





## PART III

### PLANNING THE LAYOUT

#### THE SEVENTH STEP:

By dividing the site into areas of relative suitability for building, a pattern emerges which begins to suggest the grouping of buildings according to the qualities of the land.

The seventh step is to apportion the site into units for the different purposes for which the site is to be developed.

The best quality land will be in greater demand than other parts of the site because of its good soil, its topography, its trees and its prospects. It should be devoted to the best type of development.

The good quality land may also be suitable for high grade development; but to ensure that it would be as attractive as the best land it may call for costly improvement of its amenities.

The medium quality land cannot be improved economically to permit of the highest grade development. It is the least attractive building land.

The poor land may be totally unsuitable for building. It may, however, be the best land for amenities that would enhance the value of the development as a whole.

As well as the qualities of the land, other factors must be taken into account:

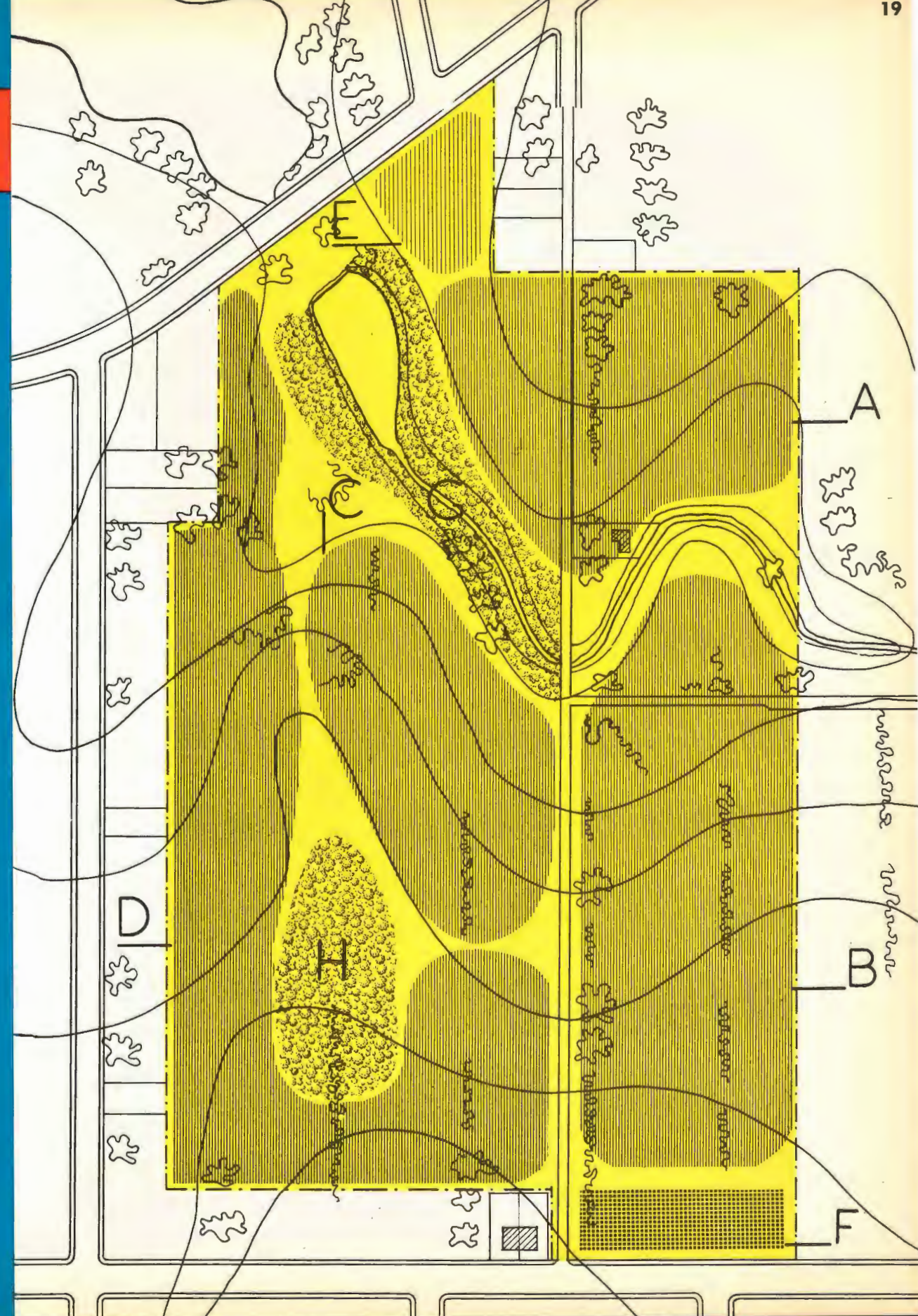
- (a) the location and type of development that first takes place may attract or repel the potential purchaser when the development has begun.
- (b) the location of shops and other commercial development is determined upon accessibility, and relation to off-site commercial development.

The diagram on the right designates the uses to which the different parts of the site are to be put.

The existing road running through the site would not be abandoned. It may, therefore, be regarded as a factor which might determine a division between one unit of housing and then another.

The following are the allocations:

- A: detached single family dwelling of best quality
- B: semi-detached units
- C and D: lesser quality houses, detached and semi-detached
- E: apartments
- F: shops
- G and H: open spaces





## PART III

### PLANNING THE LAYOUT

#### THE EIGHTH STEP:

The areas into which the site has now been split represent clusters of different types of development unrelated to each other. To associate the parts with each other a circulatory system is needed.

The next step is to develop the outline of a street system.

Streets should fulfil clearly understood traffic functions—each street should lead to another that carries a greater flow of traffic, ultimately leading to the principal traffic route that provides access to the site. The planning of the street system should be based on the following considerations:

- (i) a principal road should enable the expected flow of traffic to pass from the site entrance through to each cluster of houses. It should not offer to outside traffic a short cut through the development.
- (ii) the minor road must not only provide access to each building, but must be so arranged as to create properly sized blocks of land—readily subdivided into plots of desirable size and shape.
- (iii) the predominant directions of both main and minor streets should ensure that as many as possible of the houses can have good sunlight at either the front or the back.
- (iv) all streets must ensure easy and safe circulation, by having adequate widths for the volume of traffic they carry; by having easy grades and generous curves; and by avoiding unnecessary intersections.

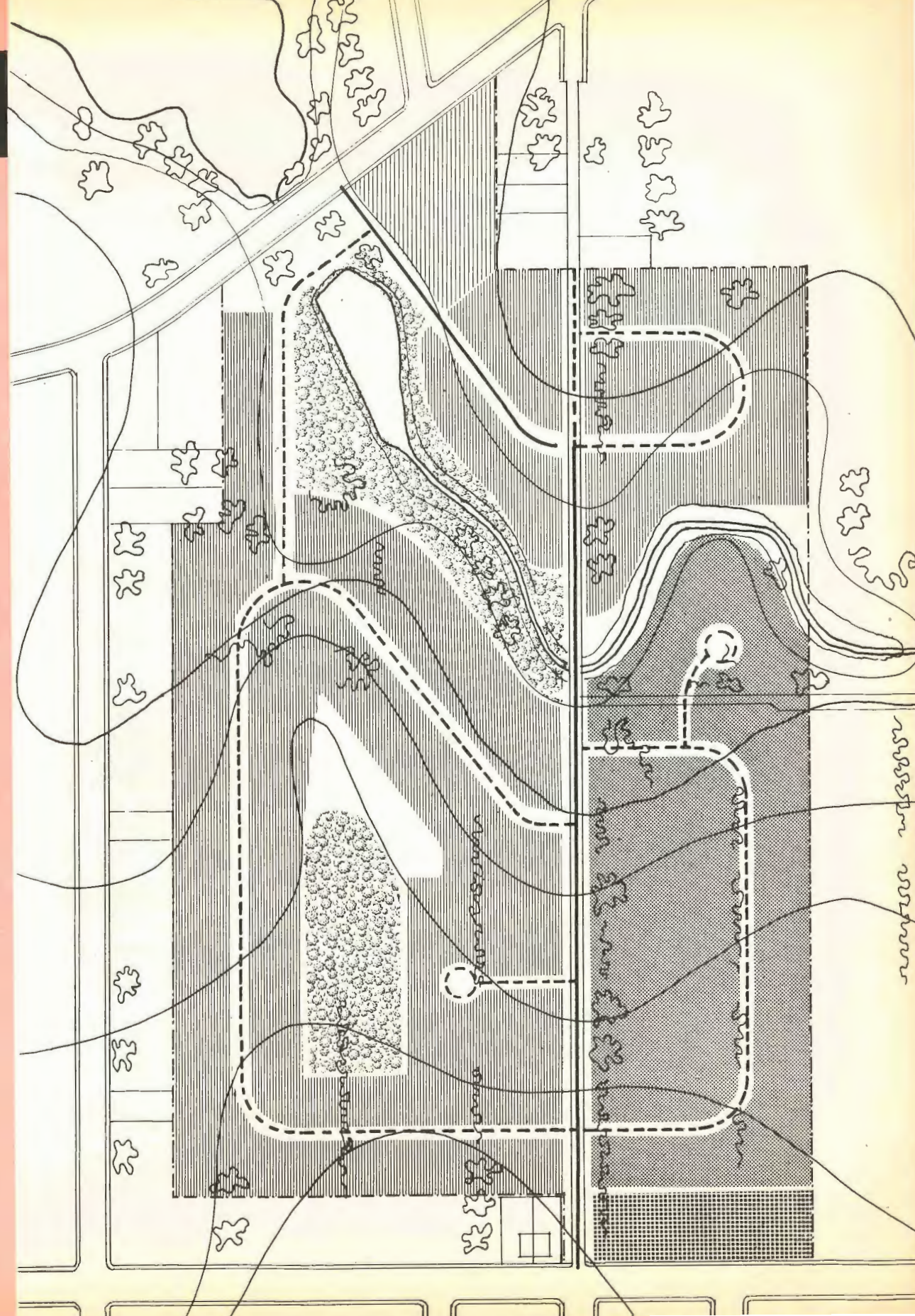
To develop the street system, first determine the route of the principal street from the point of access to the site to each group of houses.

Next fill in the minor roads so as to divide the land into blocks which can be economically subdivided. In laying out the streets at this stage, a width of 60 feet between lot lines and a depth of at least 100 feet for plots should be borne in mind.

The diagram on the right illustrates the outline of the street system that has been evolved for the site being studied.

The main road is indicated by a solid black line and the minor road by a broken line.

The site should be approached from both the Lakeshore Road and South Street. The existing surfaced road running through the site cannot be disregarded. To ensure that a good first impression of the site can be created by the developer, the main entrance from Lakeshore Road is provided through his own land. The cul-de-sacs enable remote pockets of land to be developed.





## PART III

### PLANNING THE LAYOUT

#### THE NINTH STEP:

No more than a clue has been found so far to the way in which the site might best be developed. That clue has been discovered by an ordered approach to the problem. The point has only now been reached at which a beginning can be made to plan the layout. But again a sequence of stages must be followed before the final layout is determined.

The ninth step is to sketch out the streets and the lots into which each block of land might be divided.

It is of the utmost importance that the developer at this stage should have before him any regulations respecting subdivision issued by the Provincial Government of the Province in which he is working, and any rules or regulations issued by the municipal or other authorities. These regulations describe standards and procedures that must be complied with in order to obtain approval of a subdivision proposal. They can be obtained through the local authority.

A building lot is a unit of land which provides economically for the erection of a house and for the out-of-door requirements for the household. Its size and shape must ensure adequate daylight, sufficient sunshine and circulation of air, and it must afford privacy and safety against fire hazard from adjoining properties.

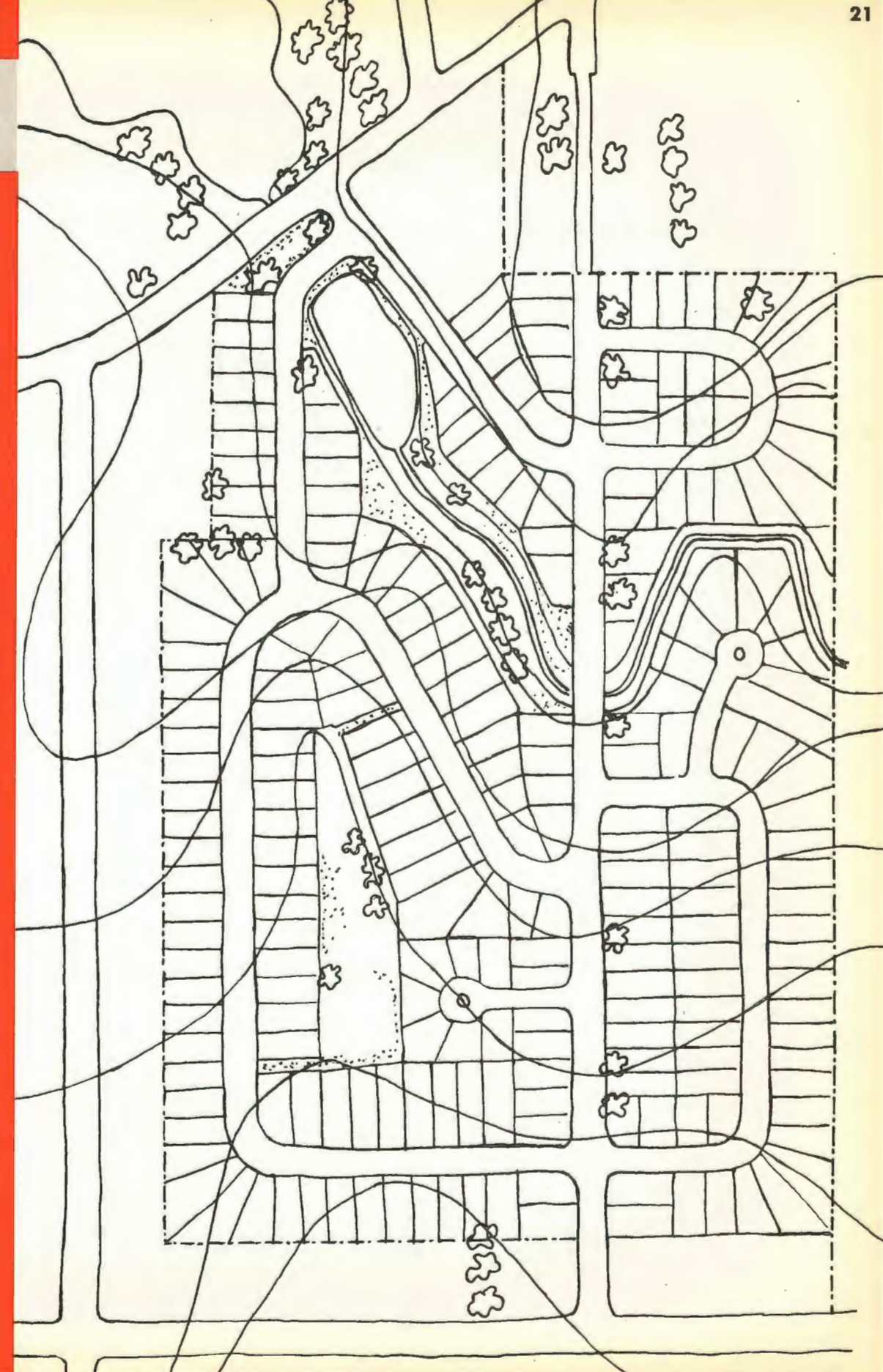
To permit a variety of house types, and to provide side-yards for access, light, air, privacy and safety from fire hazards, lots for detached dwellings should be at least 50 feet in width. A desirable width is 70 feet. For semi-detached houses the width of the lot should be at least 45 feet. A desirable width is 55 feet.

To provide for setbacks from the street line, and to allow sufficient space for household purposes, no lot should be less than 100 feet in depth. A desirable depth is 120 feet.

This stage in the study of the layout will call for a great deal of trial and retrial before a pattern of the lots is arrived at.

First draw in the whole street system at a width of 60 feet and then proceed to block in the lots in one area after another. All lots need not be exactly rectangular but plots that will limit the use of land should be avoided. Corner lots should be wider to allow for a set back on the flank of the lot. The side boundaries of lots should strike the street at right angles.

The diagram on the right shows the sketch layout of the site, in which for the first time a pattern of streets and lots appears.





## PART III

### PLANNING THE LAYOUT

#### THE TENTH STEP:

The layout has now come into focus. Its main parts have been merged together into a single unit of development that can be examined critically to ensure that as a whole and in detail, it is practical and economical.

The tenth step is to review the pattern of the plots.

First count the lots to see if an adequate number has been provided.

Next examine every plot so as to be satisfied that it is a good and economical unit of land for building purposes. Its depth should not be too great nor should its shape or the slope of the ground result in unusable land. Lots for shops must be different from and larger than those for houses.

Then see that the lots in each group are attractively arranged. Do not regard the layout as a design on paper, but visualize the effects of the layout upon an observer walking through the different parts of the site. The arrangement of the lots should show variation from one part of the site to another. It is at this stage that variety can be introduced into each part of the layout.

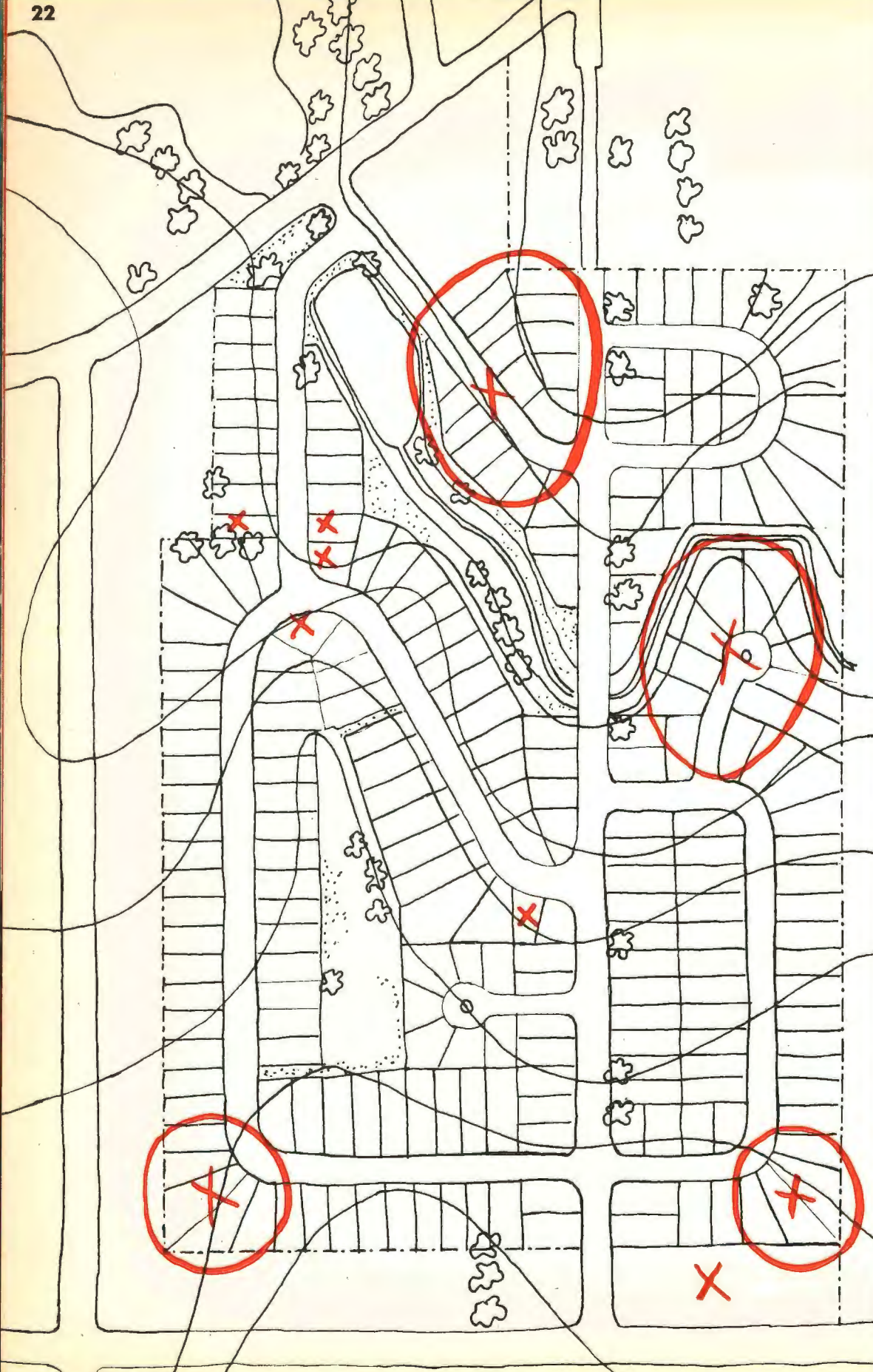
On the left errors in the pattern of the plots in the sketch layout are marked.

The total number of lots is 228.

The small crosses indicate that the plots are poorly shaped or ill-suited for the purpose.

The lot set aside for shops on South Street is totally inadequate. Such a lot requires a depth of about 200 feet in order to allow for suppliers' and customers' access, off-street parking, and service yard, as well as the depth of the shop itself.

The larger crosses encircled by lines indicate that the clusters of plots are not well arranged.





## PART III

### THE ELEVENTH STEP:

The eleventh step is to re-examine the street layout. Before proceeding, consult the local authority as to requirements for the design and layout of roads.

#### STREET PATTERN

To simplify traffic movement, mechanical removal of snow, and layout of piped services, dead end streets should be avoided. The layout should embody a system of loops which will discourage through traffic and give privacy to groups of houses. The cul-de-sac is justified only for access to a small pocket of land. If a cul-de-sac is employed, a turning circle must be provided at its end.

#### GRADIENTS

If the contours of a site permit, a well ordered rise and fall of streets is of great advantage for drainage and for variation. The maximum grade for a residential street under normal conditions should be six percent. At intersections and on curves, grades should not exceed three percent. Under difficult site conditions a maximum grade of ten percent may be permissible but only for a very short distance.

#### CURVES

To enable traffic to move safely at a speed of not more than twenty to thirty miles an hour within the site, no curve in a street should be less than 100 feet in radius on its inside edge.

#### INTERSECTIONS

If the access to a site is along a major traffic route, the point of junction and its design should be determined to the satisfaction of the road authority.

When land adjoining the site is undeveloped, future connections should be allowed for at points best suited to the street system for the site being developed. Meanwhile, such connections can remain as vacant lots, with frontage not less than sixty feet, and with neighbouring lots treated as if corner lots.

Intersections should not include more than two streets and they should not occur at too close intervals.

The street lines at intersections must meet at ninety degrees and there should be an unobstructed view across the angle of intersection by proper set back of buildings and the control of fencing and planting.

The turning radius at an intersection should enable a right turn to be made without having to cross the centreline of the roadway. The curb radii should be worked out in relation to the widths of the intersecting streets.

On the left the street system is crossed at places where it is at fault.





## PART III

### PLANNING THE LAYOUT

#### THE TWELFTH STEP:

The services should next be examined so as to ensure that they are properly related to the pattern of development and that they function correctly. The requirements of the local authority must be complied with.

#### SEWAGE DISPOSAL

The network of sewers should be a single system which provides one connection with the principal feeder main to the site. The system should be laid to fall by gravity in gradients which produce an adequate velocity of flow. It must therefore be related to the topography of the site; the sewer lines must ordinarily be laid through publicly owned land. The sewers should be at sufficient depth to prevent freezing and provide protection against vibration from traffic. They should be economical to install—neither in deep cuts nor through rock.

#### STORM WATER

The removal of storm water requires to be as carefully considered as the design of the sewer system, particularly in poor soil such as clay or heavy loam. A storm water drainage system may consist of catch-basins and open ditches on the one hand, or of storm drains on the other.

Separate storm and sanitary sewers are preferable to combined systems. Separate sewers are cheaper to maintain. A combined system for storm water and sewage has to be designed for quantities of fluid that vastly exceed the normal domestic flow; it also entails a danger of sewage back flow during heavy rainstorms.

#### WATER SUPPLY

The design of the water supply system need not be related to the topography since the water supply can both rise and fall. Pressure should be adequate to provide a sufficient volume of water at the highest point of development of at least 15 pounds per square inch.

Water and sewer lines should not be laid together in a common trench. The water lines should not be laid at less than 10 feet from a sewer line.

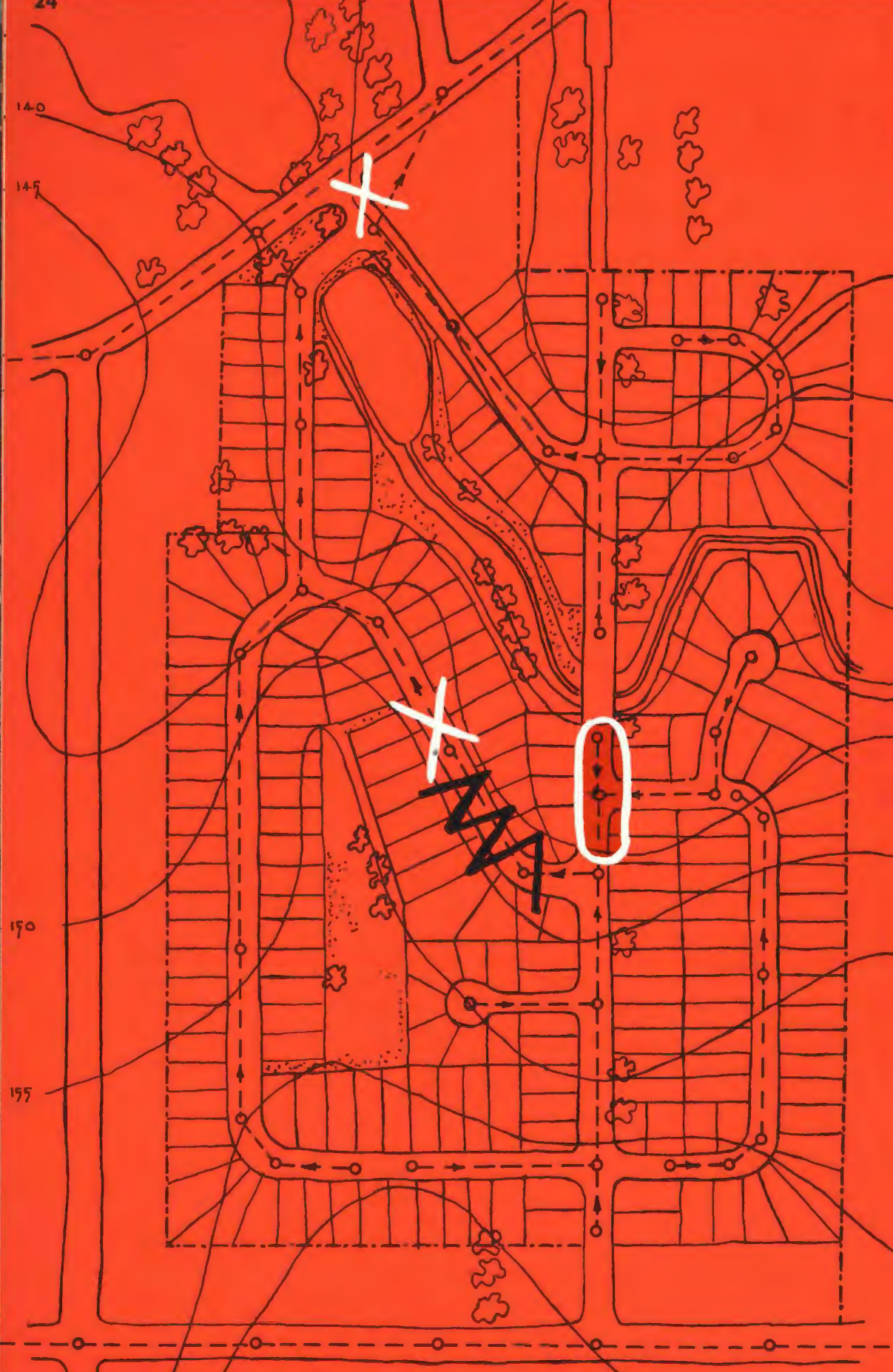
It is good practice to lay water mains on the north side of streets running east and west, and on the east side of streets running north and south—so that the sun's heat can help to prevent freezing. The layout of the system must ensure that there are no dead end mains.

The diagram on the left illustrates a preliminary design for the sewer system.

The critical error to be observed at this stage is that the system is divided into two distinct and separate units.

The fall in the length of sewer encircled does not provide an adequate flow. The length of sewer that is crossed would have to be driven through rock lying close to the surface.

Generally storm water can be run into open ditches leading to the stream—except at the point indicated by the jagged line.





## PART III

### PLANNING THE LAYOUT

#### THE THIRTEENTH STEP:

The pattern of open spaces should now be examined.

Open space provides the greatest single opportunity for improving the quality and hence the value of a development.

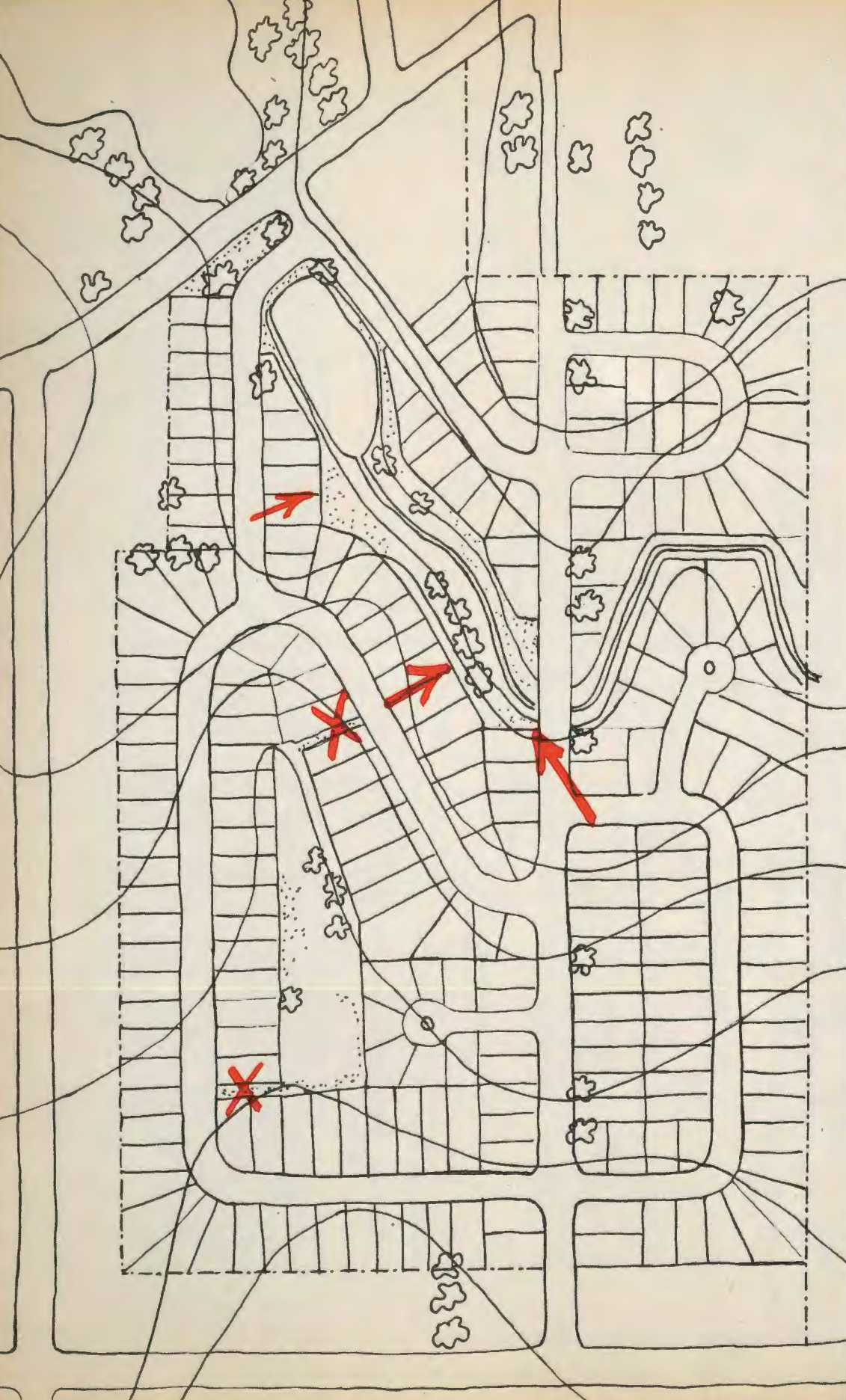
The proportion of open space should amount to not less than 10% of the total area of housing development. In small developments open space should be provided in one unit rather than in scattered portions so that the greatest benefits can be obtained for recreation and amenity purposes.

It is often more profitable to use for open space a pocket of land which cannot be well subdivided, rather than to divide it into lots that would be unsuitable for building. Where an open space is provided behind a group of houses it should be clearly visible from the street.

Where the physical features of the site permit, the pattern of open space should be so laid out as to provide a continuous ribbon running through the site.

The diagram on the left indicates the points at which the layout of open space is at fault.

The crosses indicate poor approaches to the open space at the rear of the western cluster of houses. The arrows indicate the points through which the open space system should run in order to provide a continuous pattern.





## PART III

### PLANNING THE LAYOUT

#### THE FOURTEENTH STEP:

The scrutiny of the sketch layout has evidenced a number of critical errors which should now be remedied. The next step is to correct the errors previously made and to develop a more detailed layout.

The lots should now be accurately laid out so as to ensure that every plot is of sufficient size, and embodies the characteristics referred to above.

The street system must now be considered in terms of pavement widths and sidewalks. The width for a street must be determined by the number of free traffic lanes required and any additional parking lanes that may be needed. The minimum width of a traffic lane should be ten feet and the width of a line of parallel parking should be eight feet.

- (i) for a one way residential street the minimum curb pavement widths should be 18 feet. Such a street would allow one free lane and short-term parking on one side of the street.
- (ii) for most other streets in the development the pavement width should be 26 feet. Where parking is permitted on both sides of the street the pavement width should be increased to 36 feet, which allows for two 8 foot parking lanes and two 10 foot free lanes.
- (iii) in cul-de-sacs not exceeding 350 feet in length an 18 foot pavement is adequate; a turning diameter of at least 80 feet should be provided at the end of the cul-de-sac.
- (iv) sidewalks should be designed in residential areas on the extreme width of the street along the property lines, leaving the space between the pavement and the sidewalk for planting, street lighting and snow removal. Sidewalks along residential streets should not be less than 4 feet wide.
- (v) lanes providing short cuts from one locality to another should be at least 12 feet wide with a 4 foot walk in the centre.

#### SEWAGE DISPOSAL

The velocity of flow in sewers should be at least 2 feet per second at full capacity. The sewer mains and house connections must be of an appropriate size. The connections to houses should not be less than 4 inches in diameter, and all other lines ought to be 8 inches and over according to the flow required.

#### WATER SUPPLY

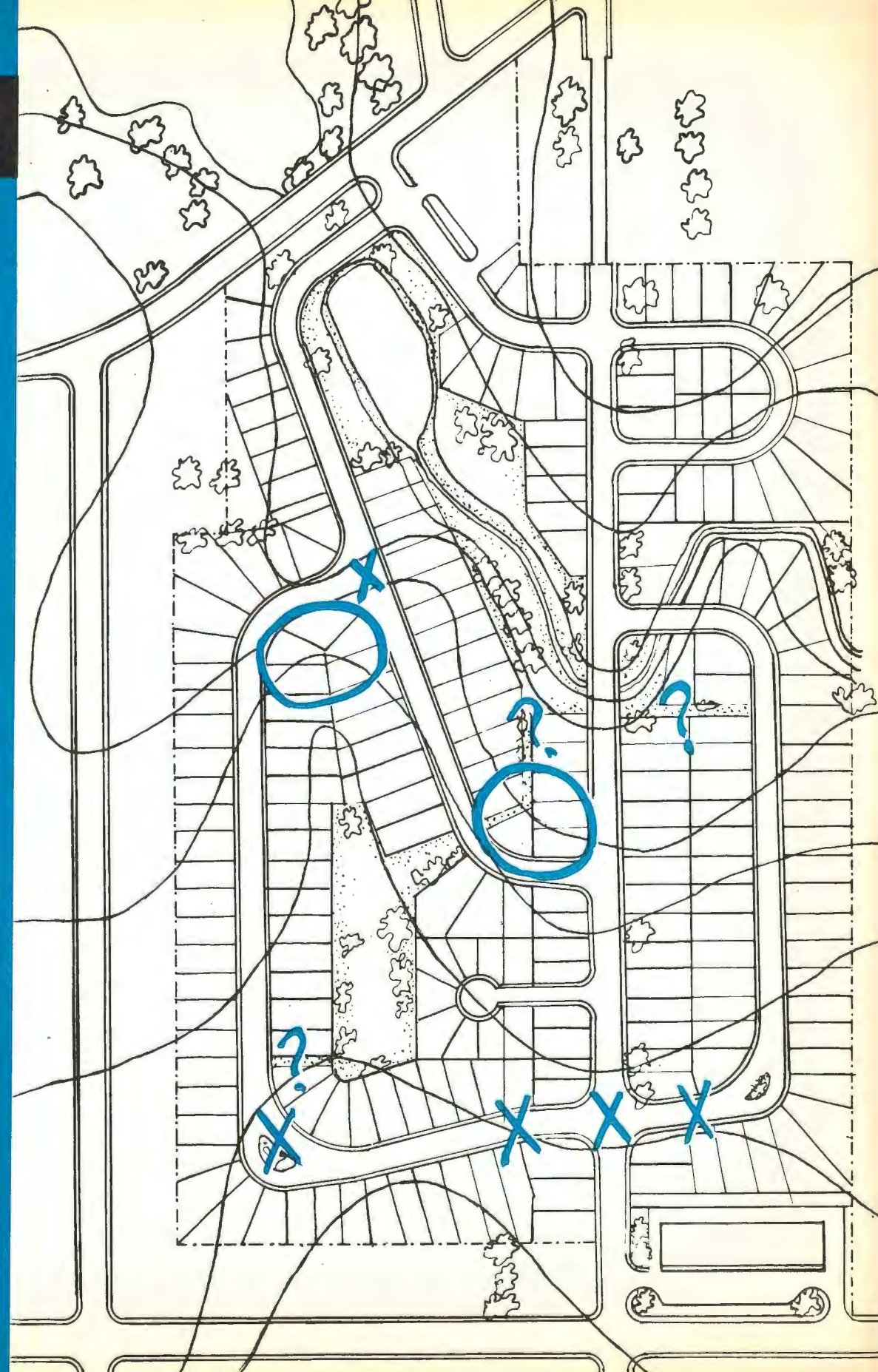
Check again to be sure that the pressure at the highest point of development will be at least 15 pounds per square inch. Mains of less than 6 inches in diameter should not be installed if the supply is to be used for fire-fighting. For smaller distribution systems the mains should not be less than 2 inches.

The diagram on the right is the draft layout embodying corrections of the errors noted at the sketch stage.

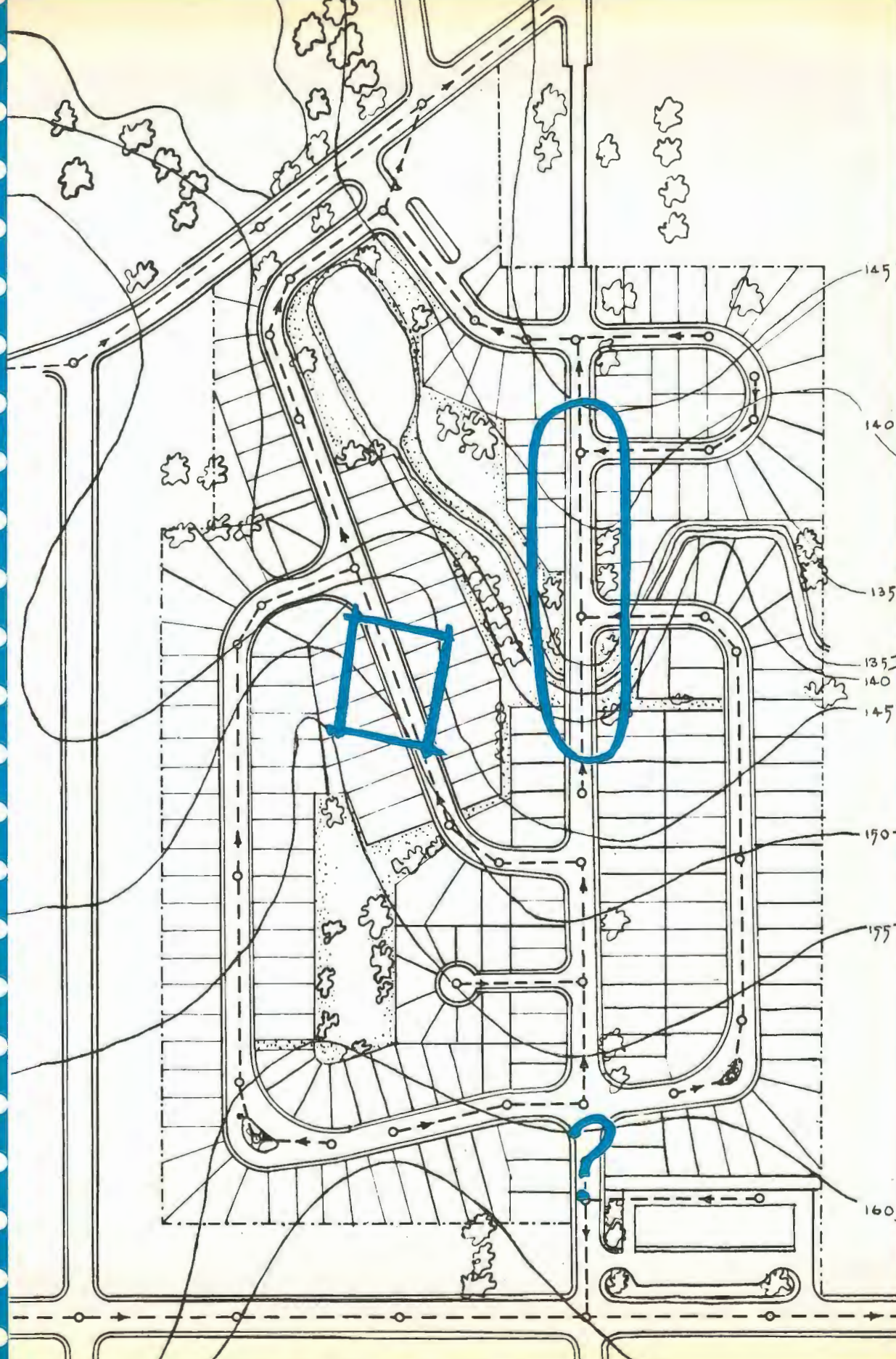
The crosses indicate points along the street system which call for more economic treatment.

The group of lots that are encircled require further consideration of their size and shape.

The question marks refer to poorly considered aspects of the open space arrangements.







## PART III

# PLANNING THE LAYOUT

### THE FIFTEENTH STEP:

Now re-examine the sewage system to ensure that changes in the layout have been properly catered for.

The diagram on the left indicates the points at which there is still some doubt about the economy of the system.

On the length of the sewer that is encircled, deep and expensive excavation may result. At the point enclosed in the rectangle the sewer may still penetrate too deeply into rock formation. There is also doubt whether the sewers in the proximity of the shops should connect with the main sewer on South Street.



## PART III

### PLANNING THE LAYOUT

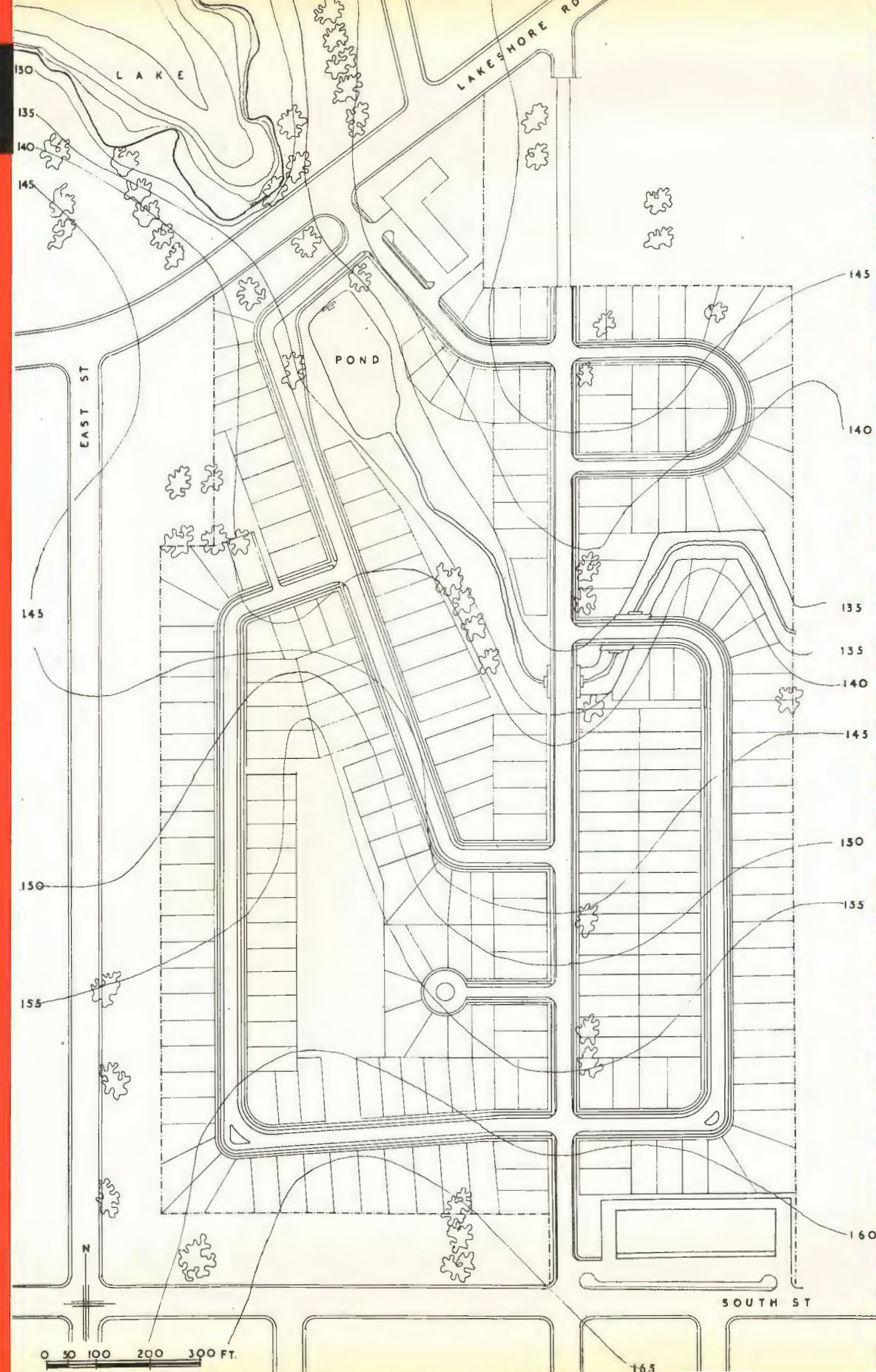
#### THE SIXTEENTH STEP:

The point has at last been reached at which the final layout for the development may be prepared. The successive stages that have been followed now enable every detail of the scheme to be correctly designed and related to the whole.

The sixteenth step is to prepare the final scheme.

The layout should be drawn with great accuracy as it will be the basis upon which the land will be surveyed for property lines, roads, sewers and other services. But the final scheme should not as yet embody the arrangement of buildings or the details of landscaping.

The diagram on the right shows the final layout.





# PART III

## PLANNING THE LAYOUT

### THE SEVENTEENTH STEP:

The character of a housing development is very largely dependent upon the manner in which buildings are sited. In addition to the placing of buildings on their lots so that each house is well lighted, quiet, and conveniently placed, their relationship to each other is critically important.

The seventeenth step is to study the siting of every house in the subdivision.

Each house should be so placed that it has adequate penetration of daylight and sunlight. No house should obstruct light and air from its neighbour. It should ensure quietness and it should be conveniently sited in relation to the road which it fronts.

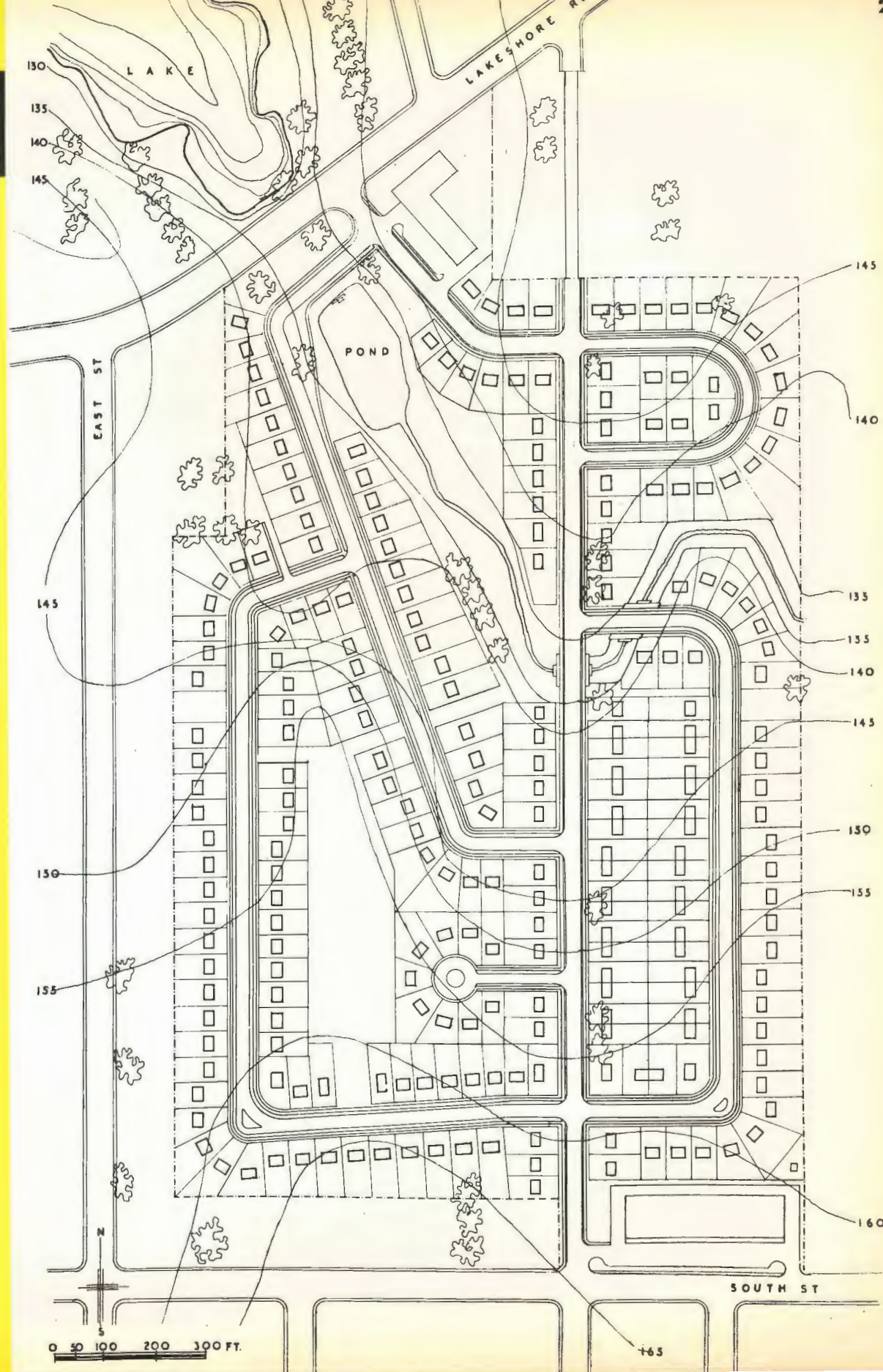
An attractive pattern in the siting of the houses is dependent primarily upon two considerations: first, the avoidance of monotony resulting from long rows of unbroken frontages; second, the arrangement of buildings to create points of special interest.

An easy way of arriving at a well related disposition of buildings is to use small blocks of wood cut to the scale of a house unit, and to arrange them on a print of the layout until a satisfactory pattern has been achieved.

A building line is usually established to ensure light, air and privacy. It also makes certain that the houses will be arranged in an orderly way along the street. While a building line of uniform depth for the whole layout may bring about all-over order, it does not prevent monotonous regularity. It is best to establish variations of the building line so that a variety of groupings will result.

Restrictive covenants in deeds specifying the precise use of property, the side, rear, and front yard requirements, the cost of the house and its architectural design, are means by which the disposition of buildings and the appearance of the site may be well regulated.

On the right the siting of each building in the scheme is shown.





## PART III

# PLANNING THE LAYOUT

### THE EIGHTEENTH STEP:

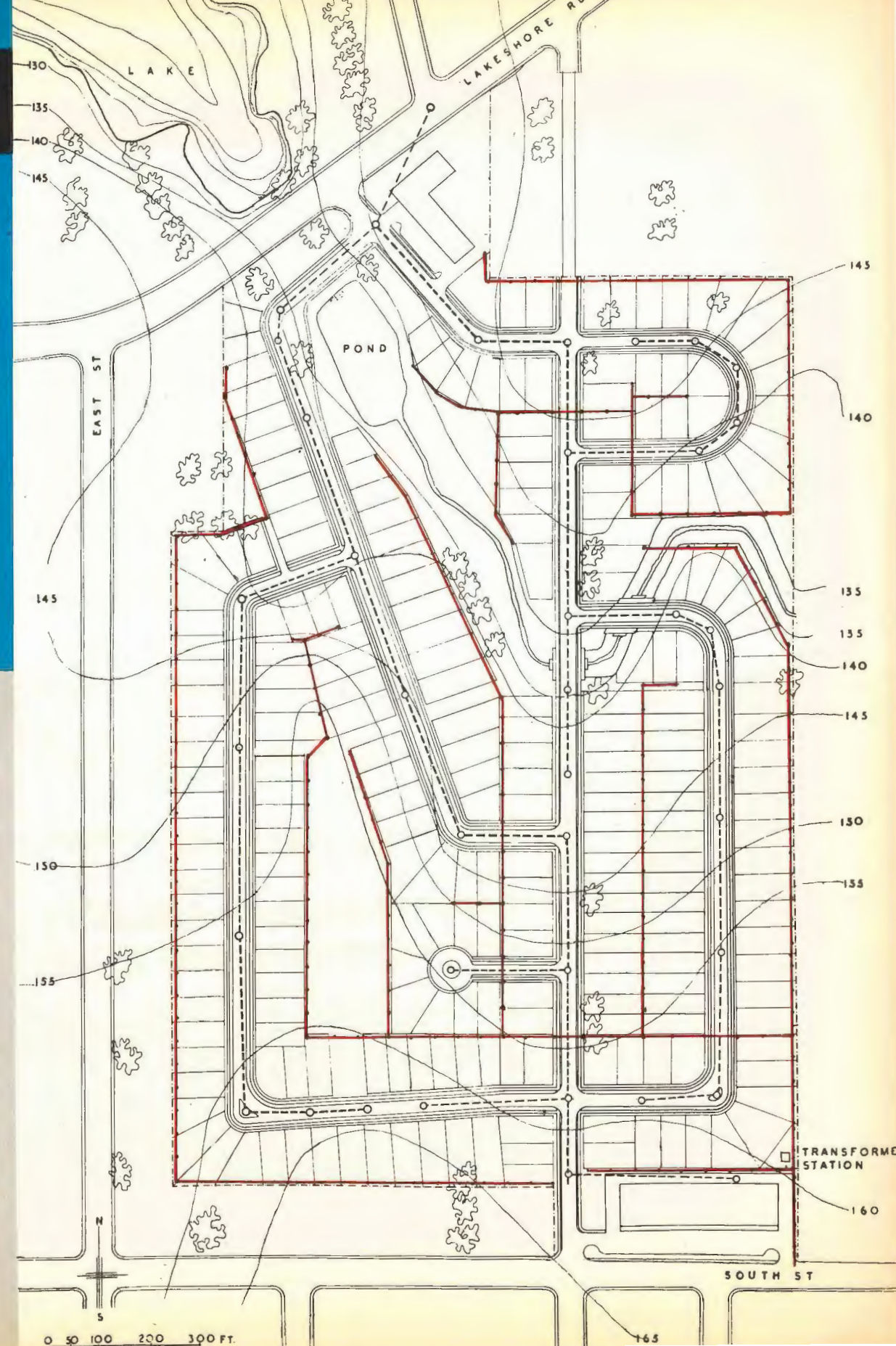
In addition to the layout of the sewers, it is important to consider the alignment of the power transmission lines and telephone services. A disorderly pattern of poles and wires can do much to disfigure the landscape. Next, lay out the sewers and the power and telephone lines within the site.

This is the point at which to discuss with the power and telephone companies the feasibility of wholly underground systems. In the long run, the greater first cost may be repaid in lower upkeep and in greater attractiveness.

If pole lines are to be provided they should be kept off streets. A system of distribution should be worked out whereby power lines run at the backs of properties, only crossing streets at a few selected points. All street lighting mains should be run underground.

The land through which the distribution lines run should either be dedicated as public land or covered by a caveat or easement which permits access for repairs and maintenance.

The illustration on the right shows the sewage system by a broken line. The electrical distribution and telephone service is indicated by the red line. A transformer station is provided behind the shops at a point close to the mains on South Street.





## PART III

### PLANNING THE LAYOUT

#### THE NINETEENTH STEP:

The planning of a residential area is incomplete until landscaping has been considered. It adds more to the immediate attraction and permanent value of the project than any other element.

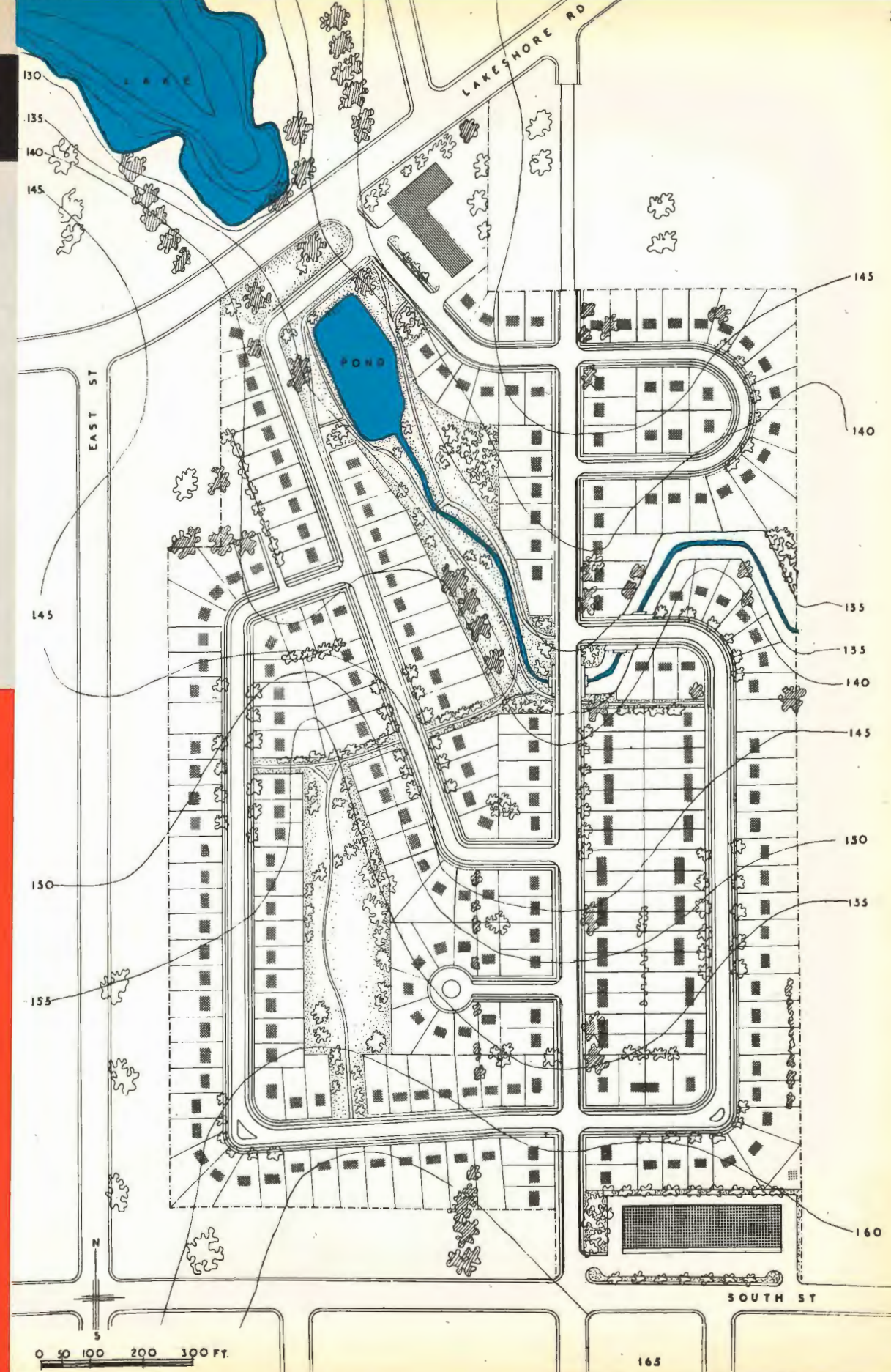
The final touch in the design is, therefore, the landscaping.

The pattern of planting should be considered in relation to the houses, the streets and open spaces. The landscaping must contribute to the effects which are sought in the siting of the buildings. Trees may be employed as protection against adjoining developments and to ensure privacy. They may also be used to produce shade and deaden noise. This may call for the provision of trees and shrubs within particular lots, as well as for planting on publicly owned land.

Shrubs should be planted so as to stop pedestrians from running out of a foot path into a vehicular roadway.

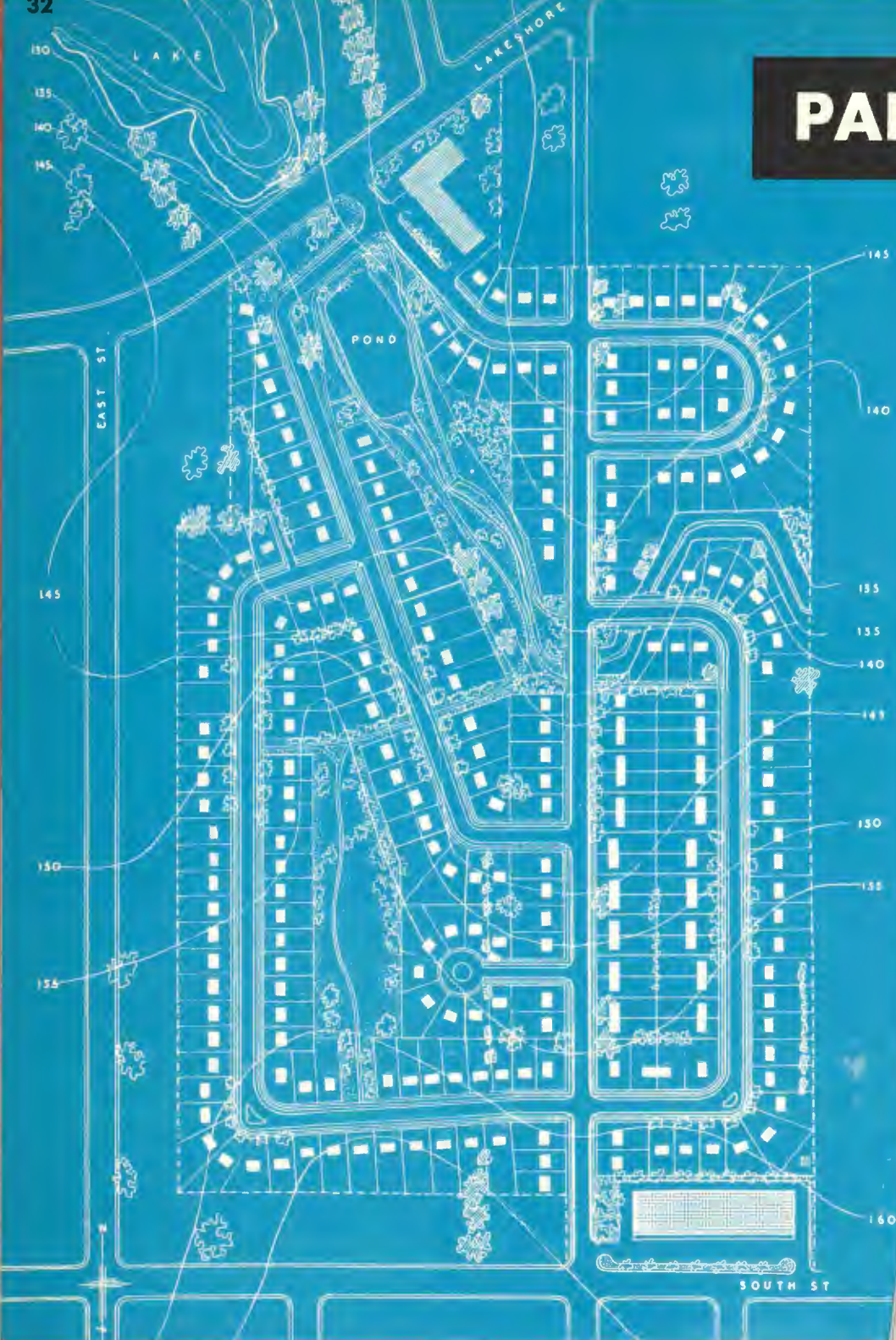
The types of trees to be planted should be those that are known to flourish in the vicinity. A landscape architect should be employed whenever possible.

The pattern of planting and footpaths is shown on the right. The planning of the layout is now complete.





# PART III





## INTRODUCTION

Within the last five years rows upon rows of new houses have sprung up on the outskirts of the cities and towns of Canada. The land upon which most of this development has occurred had been lying idle in expectation of such happenings. It had long ago, and in earlier speculative days, been earmarked for the purpose by subdividing large tracts of country-side into gridirons of uniform sized building lots. Thus it was inevitable that much postwar housing should have been mediocre in layout—it failed to provide a worthwhile environment for most house purchasers, and it brought disrepute to developers, individually and as a whole.

The stage has now been reached at which land needed for further housing lies beyond the belts of registered subdivisions that surrounded our cities for the last two decades. The developer is being freed of at least one of the handicaps which had frustrated much of his endeavours. He now has the opportunity of looking afresh at methods of land subdivision, and of achieving better results than by following entrenched ways of laying out housing developments. Within his grasp there now lies the opportunity, not only to make profit, but to carry out work with distinctive qualities that will add to his reputation and to the lasting satisfaction of his clients.

The purpose of this handbook is to help both the developer that lays out a project which he himself will construct, and the subdivider that lays out lots for sale upon which others will build. It describes a series of steps that should be taken by a developer—from his first decision to undertake a project, through to the point when he is ready to borrow money and to begin building operations. These steps are demonstrated by reference to an actual locality on the Island of Montreal.

The handbook is divided into four parts. The first deals broadly with the effects of patterns of land enclosure upon subdivision. The second part deals with factors bearing on the selection of a site; the third illustrates the sequence of steps that should be taken in the preparation of a layout; and the fourth part deals with some financial aspects of land subdivision.



**PART I**



### **THE LAST STEP**

To visualize the total effect of the layout a model of the scheme should be made. It will be of very practical value in conveying to prospective house purchasers the ultimate character of the development.

The photograph on the opposite page is a view of a model of the layout which has been planned.



## PART IV

# FINANCIAL ASPECTS OF THE LAYOUT

The ultimate test of a subdivision layout lies in its financial soundness. The critical factor for every developer is the extent to which mortgage assistance can be expected. The greater the loan, the smaller the down payment; and the less the down payment the greater the range of prospective purchasers, and the quicker the rate of disposal.

Mortgage terms are based on the degree of security of investment in the proposal. Security of investment is assessed on the whole quality of the layout—the extent to which the market for houses will be met; the character of the surroundings and the relation of the project to them; the nature of the layout respecting both physical and financial considerations; the standard of house accommodation, plot sizes, services, open spaces and general amenities to be provided; and upon the existence of zoning control.

To test the financial aspects of the scheme the same site was subdivided in a conventional way, as illustrated above. Here the plots number 215, as compared with 240 plots plus the flats and shops in the planned layout.

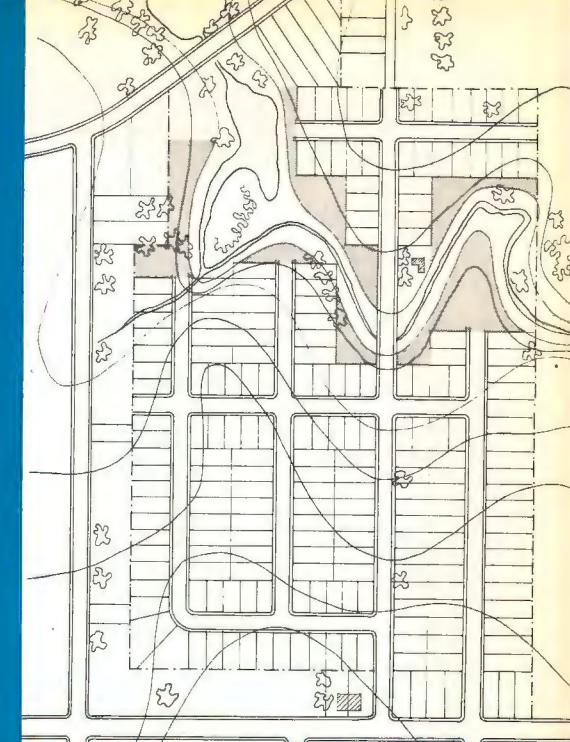
These two layouts were then submitted to Central Mortgage and Housing Corporation as proposals for mortgage assistance. The costs of construction, (including the value of land) and the selling prices for the various types of houses were taken to be the same in both cases.

The results were as follows:

House Type	Cost of Construction (Including Land)	Selling Price	Planned Development		Conventional Development	
			Loan	Down Payment	Loan	Down Payment
5 room Detached	7,450	8,500	7,140	1,360	5,880	2,620
6 room Detached	7,940	9,060	7,540	1,520	6,320	2,740
5 room Semi-Detached	14,500 (2 dwellings)	16,600	14,040	2,560	11,200	5,400
6 room Semi-Detached	15,480 (2 dwellings)	18,500	15,400	3,320	12,280	6,440

(The amortization period in the Planned Development was set by the Central Mortgage & Housing Corporation at 30 years, and for the Conventional Development at 20 years.)

The Planned Development was awarded a greater loan, a longer period of amortization, and a smaller down payment per house—the Conventional Development a lesser loan, a shorter period of amortization, and larger down payment per house.





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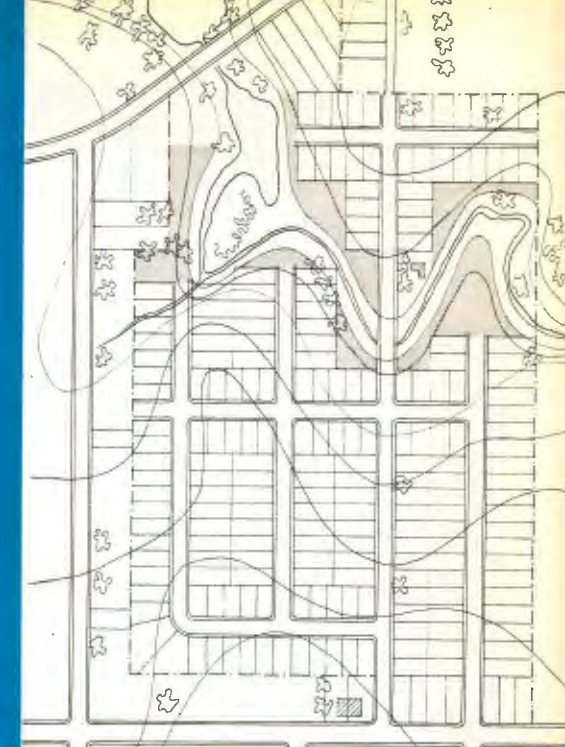
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## FINANCIAL ASPECTS OF THE LAYOUT

The financial benefits of planning are even more vividly shown in the following table:

Provisions in Scheme		Cost (Including Land)	Down Payment	Selling Price	Profit
Type	Number				
5 room Detached	100	745,000	136,000	850,000	105,000
6 room Detached	108	857,520	164,160	978,480	120,960
5 room Semi-Detached	16	232,000	40,960	265,600	33,600
6 room Semi-Detached	16	247,680	53,120	296,000	48,320
Flats	24	138,000	40,000	153,360	15,360
Shops		4,200 (land only)		9,000 (land only)	4,800
<b>TOTALS</b>	<b>264</b>	<b>2,224,400</b>	<b>434,240</b>	<b>2,552,440</b>	<b>328,040</b>
5 room Detached	91	677,950	238,420	773,500	95,550
6 room Detached	100	794,000	274,000	906,000	112,000
5 room Semi-Detached	12	174,000	64,800	199,200	25,200
6 room Semi-Detached	12	185,760	77,280	222,000	36,240
<b>TOTALS</b>	<b>215</b>	<b>1,831,710</b>	<b>654,500</b>	<b>2,100,700</b>	<b>268,990</b>

**PLANNED  
DEVELOPMENT**

In the Planned Development the gross profits are \$328,040 representing 14.7% on the capital cost of the scheme. The value of down payments amounts to 17% of the selling price.

In the Conventional Development the gross profits are \$268,990 representing 14.7% on the capital cost of the scheme. The value of down payments amounts to 31.2% of the selling price.

The Planned Development shows a greater profit of \$59,050 because of the greater number of dwelling units to be built; but at the same time half the ratio between down payment and selling price—from the mortgage point of view, the proof of the pudding.

Although the percentage of profit is not reduced, the risk is minimized—planning tends to convert a speculative venture into an almost assured success.

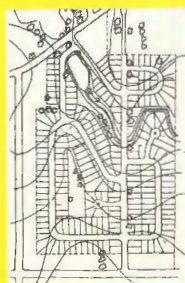
An important consideration is the improvement tax. In the Planned Development the total length of road amounts to 7,320 lineal feet as compared with 7,275 in the case of the Conventional Development. Thus the cost of street works and other services would in both cases be more or less the same. But in the Planned Development, because of the greater number of building lots, the flats and the shops, the improvement tax per lot would be less.

To sum up, in the Planned Development the profit is the same; the amount of down payment is well within the range of expectation and consequently the rate of disposal will be faster; the improvement tax will be less and the risks and hazards will be few. Furthermore, the investment by the purchaser will be more secure.

**CONVENTIONAL  
DEVELOPMENT**



**THUS** it is profitable, less hazardous, and more efficient for the developer properly to plan a subdivision. In addition he can fulfil his desire to benefit the community by bringing into being a more satisfactory human environment which will give lasting pleasure and security to his clients.









HOW TO

# SUBDIVIDE

